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INSTITUTE FOR DEFENSE ANALYSES

**Western-Style Armaments for
New NATO Countries**

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David R. Markov

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PREFACE

The Institute for Defense Analyses (IDA) performed this work under the task entitled "Western-Style Armament Capability for New NATO Members." Our objective was threefold: (1) to determine the state of weapons production in the three new countries entering NATO (Czech Republic, Hungary, and Poland) and compare it with Western-style armaments production; (2) to suggest alternative ways to convert the countries' manufacturing processes to produce NATO-compatible armaments and recommend ways of motivating internal change; and (3) to investigate some aspects of costs associated with upgrades and the cost savings of good planning in this area.

The authors thank the reviewers, Mr. James Wilson and Dr. David Graham of IDA, as well various personnel in the U.S. Army.

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SUMMARY

As of 12 March 1999, NATO membership expanded with the addition of three new countries: the Czech Republic, Hungary, and Poland. As the new countries are required to participate in NATO missions, common ammunition and weapons meeting NATO standards will most likely be needed. These countries have varying expertise in producing ammunition and weapons to Western specifications. To reduce the costs of transitioning their industrial bases to produce such ammunition and weapons, a burden that the United States and DoD in particular will help to carry, existing ammunition and weapons industries should be converted to Western-style production techniques and quality and safety practices as rapidly and efficiently as possible.

This paper begins with a look at the three new NATO members' currently fielded ammunition and weapons to assess their current compatibility with that of NATO. While all three new members possess some ammunition and weapons comparable to at least the calibers and families of those recognized by NATO, we discovered that, especially in the medium to large caliber range (except for mortars), none of the three fields much that is compatible with NATO. It is useful as a starting point to compare calibers and weapons families fielded by NATO and the three new members, but it is also important to consider that some of the new members' ammunition and weapons are based on Soviet/Eastern bloc design and manufacturing or could simply be old, outdated, or in other ways incompatible.

We also examine the state of the armaments industries in the three countries. To provide an overall context, we provide information on the unique position of the defense industry in East and Central Europe (ECE) during the Cold War. More specifically, we discuss the general issue of quality and safety in ECE domestic defense industries. Then, for the three new members, we provide a defense industry overview and more detailed information on the domestic ammunition and weapons industry and manufacturers. Appendix A provides details on domestic ammunition and weapons production, specifically isolating relevant quality certification/registration, warranty, documented safety standards, and NATO compatibility information and listing domestic manufacturers and their relevant contact and product line information.

Having assessed the current situation, we describe the existing NATO processes and organizations involved in compatibility and interchangeability. We then add descriptions of the U.S. defense organizations, particularly in the Army, that can aid the three new NATO members in their task to achieve compatibility and interchangeability of their ammunition and weapons.

In summary we present a series of 1) observations on the states of the Czech, Hungarian, and Polish defense industries and 2) recommendations on how their industries may pursue the production of NATO interoperable and compliant ammunition and weapons.

In general, we found that the defense industries of the Czech Republic, Hungary, and Poland are better positioned with regard to quality and safety in manufacturing than perhaps previously expected. In fact, all three are able to produce seemingly NATO-compatible weapons and ammunition in the category of small arms. Furthermore, some defense industries, most notably in Poland, have already sought and achieved ISO 9000 certification. Some more specific observations are as follows:

- Many of these countries, as a matter of state policy, have resolved to retain an indigenous arms industry; thus, any solutions to assist these countries should consider this fact.
- All three countries appear to be moving toward NATO standardization through a three-track procurement strategy (in order of priority):
 - Local upgrades and modifications
 - License foreign production
 - Foreign purchases
- The likelihood exists that U.S. ammunition manufacturers could be encouraged to assist Central European manufacturers in adapting to NATO and ISO standards. The forging of these partnerships is important for rapidly and cost-effectively moving these countries toward NATO standards.
- Several Western ammunition manufacturers are exploring joint ventures with companies in Poland and the Czech Republic; however, no firm commitments have been made to date.
- Ammunition manufacturing in the three countries studied is a mix of state-owned and private companies, making broad approaches difficult. Each country must therefore examine its own needs and tailor an approach accordingly.

- Czech Republic's defense industry is a mix of private and state-owned.
- Poland's defense industry is state-owned, but recent decisions indicate that key defense industries will soon to be privatized
- Hungary's defense industry is state-owned and will attempt in the near future to privatize. The future of its defense industry is unclear, and any attempts to motivate change must be tempered with this in mind.
- Among the countries studied, the Czech Republic is the furthest along in achieving NATO and ISO standards. Poland is next and Hungary is the furthest from meeting such standards.
- The Czech Republic has achieved its rapid progress toward standardization through years of trading with the West—primarily through the sales of hunting and sporting ammunition. This trade forced Czech ammunition manufacturers to closely follow Western manufacturing standards and practices.
- Poland and Hungary need the most assistance in areas other than small arms ammunition, e.g., artillery and mortar round production.

All three of the new NATO members are facing strict budgetary constraints in their efforts to modernize fielded ammunition and weapons for NATO interoperability and compatibility. As the new NATO members seek to modernize their armed forces, they will each have to weigh political, military, and economic considerations in choosing an approach related to the following three alternatives: 1) Purchasing compatible ammunition and weapons from the West; 2) Producing domestically compatible ammunition and weapons using Western manufacturing practices with respect to quality and safety; and 3) Engaging in co-production activities to acquire compatible ammunition and weapons.

The transition for these new NATO members to Western-style production, safety, and quality practices in order to produce NATO-compatible ammunition and weapons will be an expensive process that has to be faced as a long-term proposition. In the near term, efforts should focus on such things as common terminology, safety procedures, and compatible system procedures. As new NATO members, the Czech Republic, Hungary, and Poland will continue to become familiar with and immerse themselves in the activities and procedures related to quality, safety, and standardization already taking place under the auspices of NATO.

In addition to turning to ongoing NATO organizations and procedures, the Czech Republic, Hungary, and Poland should also leverage opportunities to tap the expertise in

ammunition of the U.S. and DoD. Picatinny Arsenal and Watervliet Arsenal both stand poised to offer an array of technical services, through the Foreign Military Sales (FMS) program, aimed at various aspects of manufacturing safe and quality products. Furthermore, the purchase of defense products and services may also be arranged directly with U.S. commercial industry under the International Traffic in Arms Regulations (ITAR).

1. INTRODUCTION

Enlargement of the North Atlantic Treaty Organization (NATO) in March 1999 to include the Czech Republic, Hungary, and Poland has given cost and interoperability high priority among the new members and the NATO-16.¹ New members need to replace and upgrade their military equipment in order to participate more compatibly in peacekeeping and other NATO missions. They have not, however, moved quickly to replace Warsaw Pact/Soviet-type ammunition and weapons with those that are NATO interoperable and based on Western-style production, even though such action would most likely improve interoperability at comparatively low cost.

To upgrade their ammunition and weapons to NATO compatible standards, the new member countries could merely purchase the appropriate equipment from the United States and other NATO countries. This option would likely prove too costly, however, given the economic and financial constraints still being faced by these countries in the wake of their continued political and economic transformations. A cheaper alternative might be for these countries' domestic defense industries to produce NATO-compatible ammunition and weapons, but they would most likely have to retool their old Warsaw Pact weapons and munitions facilities. If unfamiliar with Western-style production, they may also need technical, quality, and safety assurance assistance. Given the necessary assistance, these countries should be able to upgrade their ammunition and weapons reasonably quickly and efficiently, allowing their militaries to become more compatible and effective members in NATO operations. Moreover, such actions should produce cost savings for new and NATO-16 members and perhaps even the Department of Defense (DoD).

IDA was tasked to evaluate ammunition and weapons production capabilities of the new NATO member countries and recommend a process for assisting them in the efficient and cost-effective conversion of their production capabilities to produce Western-style ammunition and weapons in compliance with NATO quality and safety

¹ "NATO-16" is used throughout this paper for comparative purposes to refer to the NATO of 16 members prior to the accession of the Czech Republic, Hungary, and Poland.

assurance process requirements. By seeking this information, the DoD hopes to gain insight into the process of outfitting the new member states with quality and safe ammunition and weapons that meet NATO interoperability requirements and help minimize the costs of NATO enlargement. Specifically, this study was to—

- Determine the state of weapons production in the three countries and compare it with Western-style armaments production
- Suggest alternative ways to convert the countries' manufacturing processes and recommend ways of motivating internal change
- Investigate some aspects of costs associated with upgrades and the cost savings of good planning in this area

A. BACKGROUND

To set the stage for this study, IDA initially considered the larger issue of NATO enlargement:

- Why include East and Central Europe (ECE) countries in NATO?
- How will ECE countries have to adapt to NATO membership?

1. Why Include ECE Countries in NATO?

NATO is a collective defense alliance that has served its members since 1949. The issue of NATO enlargement to include ECE countries has emerged as a result of the end of the Cold War and its rigid bipolar international system. The Soviet Union and its Eastern bloc—represented by the Warsaw Treaty Organization (military-defense alliance) and the Council for Mutual Economic Assistance (economic cooperation)—have disintegrated, leaving the ECE countries to fend for themselves for the first time in years. All aspects of their countries are affected—defense, political organization, and economics. The ECE countries, with their newfound autonomy, have embarked on political and economic system transformations that reflect the democratic and free market ideals of the West. For these countries, membership in NATO is viewed as a means to further associate and align themselves with the political and economic institutions of the West.

While the collapse of the Cold War's bipolarity has opened the opportunity for ECE democratization and conversion to market economies, it has also unleashed various ethnic and national tensions that introduce an element of unpredictability and instability to the region. In this new atmosphere, the ECE countries must struggle to reform and

modernize their militaries (previously partially directed by the Soviet Union and embedded in the larger Warsaw Pact military-defense alliance) in order to provide an adequate defensive posture against potential threats. NATO holds that "an attack on one is an attack on all"; thus the ECE countries see NATO membership as a way to alleviate some of their defense uncertainties. Moreover, participating in collective defense agreements such as NATO may enable the ECE countries to decrease their defense expenditures, while continuing to pursue necessary economic changes and building trade relationships. Many believe that economic gains and progress need to be realized relatively quickly, lest the populations of these ECE countries become increasingly disenchanted with the arduous process of political and economic change. In the latter case, rising political opposition or ethnic, national, and religious tensions could ultimately have consequences for the defense and security of not only these ECE countries, but also Europe as a whole. NATO membership for a selective group of ECE countries, therefore, is viewed as a method for the West to ensure some level of involvement and stability in the ECE region, the continent of Europe, and even the Euro-Atlantic area.

2. How Will the ECE Countries Have to Adapt?

With the admittance of the new ECE countries, the preparedness and readiness of the NATO-16 members will need to broaden to encompass these new member countries' territories. Likewise, the new members will need to possess the resources and facilities to participate in and accommodate such NATO operations within and outside their territorial borders.

It is important to note that the ECE countries will need to reform and modernize their militaries, regardless of their membership in NATO. NATO membership, however, is anticipated to spur this process and perhaps make it a bit easier and less costly.

Aside from reform, NATO membership for ECE countries will require that they strive to meet the NATO goals of standardization and interoperability among NATO's other 16 member states. Interoperability goals are in the areas of equipment, facilities, language, and doctrine, and all the NATO countries work to achieve this standardization and interoperability. However, it is an arduous process that is not necessarily fully realized even among long standing members.

The ECE countries cannot devote all of their time, money, and resources to reorganizing and rebuilding their militaries to satisfy NATO interoperability and standards. Military and defense changes will be competing with all other aspects of

political and economic transformation for these countries' limited funds and resources. Improvements to quality and safety are long-term challenges that require sustained attention for the three new countries.

B. IDA APPROACH

We began by assessing the ammunition and weapons status of the Czech, Hungarian, and Polish militaries in light of NATO standards and interoperability requirements. In doing so we evaluated the countries' abilities to domestically produce the ammunition and weapons that are to be used by the Czech, Hungarian, and Polish militaries and looked particularly at their ability to ensure quality and safety in the production of ammunition and weapons products. Wherever possible, we identified existing programs and services available through NATO that could be accessed to assist in selecting the most cost-efficient approach toward producing and then fielding quality, safe, and NATO-interoperable ammunition and weapons within these three countries. By easing the new countries' NATO membership transition and military modernization efforts in the most cost-efficient manner, the United States should expect to witness savings through its predicted share of NATO enlargement costs. Furthermore, U.S. defense organizations and their expertise in producing high quality and safe ammunition and weapons may be leveraged as a resource for the modernization activities undertaken by the three new members. IDA interviewed, either through telephone calls or visits, various Army personnel involved in the many programs available to these three countries.

1. Task Definitions

The original task assigned to IDA spoke of "armaments." Armaments are defined as "the arms and equipment with which a military unit or military apparatus is supplied."² In the course of the study, we determined the scope to more specifically include both ammunition and weapons as defined here. The 1994 edition of *the Department of Defense Dictionary of Military and Associated Terms* (p. 251) defines *ammunition* or *munitions* as "a complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions." *Weapon* is a broad term that refers to "any

² *Random House Unabridged Dictionary*, Second Edition, 1993, p. 114.

instrument or device for use in attack or defense in combat, fighting, or war, as a sword, rifle, or cannon.”³ For the purposes of this study, weapons include firearms and other ballistic infantry and artillery systems.

Bullets are probably the items most commonly associated with the term *ammunition*. Ammunition, however, represents a broader category of items that all contain the destructive materials necessary “to damage, destroy, or suppress hostile personnel and material.”⁴ Ammunition can therefore include such items as bullets, artillery shells, missiles, torpedoes, mines, bombs, mortars, grenades, and rockets. The *Jane’s Ammunition Handbook* further distinguishes or categorizes ammunition based on the following 12 classifications: small arms, cannon, tank and anti-tank guns, field artillery, mortars and fuses, projected grenades, artillery rockets, medium caliber air defense guns, naval and coastal defense guns, modular propellant charge systems, artillery fuses, and rocket fuses.

Throughout this report, we speak of the difference between Western and Eastern manufacturing practices. The perceived differences are in such areas as environmental concerns, liability and product safety, and variability control. For example, Western manufacturing methods have long had to consider environmental regulations, whereas Eastern methods have not seemed to be focused on this “green manufacturing.” Moreover, Western practices have included extensive safety testing and risk decision tracking whereas the Eastern practices have not seemed to. There have been many recent changes in the manufacturing practices of the former Warsaw Pact countries, as evidenced by their industries’ adoption of the ISO 9000 series of quality standards. For purposes of this paper, then, the distinction between Western and Eastern manufacturing practices focuses on those standards and practices leading to NATO or Warsaw Pact-compatible ammunition and weapons, respectively.

2. Change in Scope

Originally, we were asked to develop cost estimates. After much research and consultation with IDA experts in this area, we determined that the costs associated with NATO enlargement represent a very complex and highly charged political issue. Cost estimates depend on the assumptions made about the current state of the countries’

³ *DoD Dictionary*, p. 2153.

⁴ *Jane’s Ammunition Handbook*, Terry J. Gander, ed., Sixth Edition, 1997–98, p. 9.

defense programs and what the true requirements are; consequently, they vary over a wide range. We thus made the decision to examine areas other than cost. In so doing, we broadened the range of alternatives we considered beyond that of converting the three countries' defense plants to Western-style production techniques, especially where the U.S. Army can play a part.

C. OUTLINE OF THE REPORT

Chapter 2 identifies the ammunition and weapons being fielded and any associated policies for NATO interoperability declared by the militaries of the Czech Republic, Hungary, and Poland. Chapter 3 presents the results of an investigation to identify characteristics and trends of the domestic defense industries as well as the ammunition and weapons manufacturing capabilities and capacities within the Czech Republic, Hungary, and Poland. Chapter 4 outlines the NATO processes and organizations with which the Czech Republic, Hungary, and Poland are becoming involved for fielding their militaries with NATO interoperable and compliant ammunition and weapons. This chapter includes descriptions of the various U.S. defense programs available to these three countries to help meet the compatibility objectives. Chapter 5 concludes with several general observations, a summary of the alternatives available to the three new NATO members, and recommendations that address the following questions:

- How can these new NATO members ensure the interoperability, safety, and quality of their ammunition and weapons?
- What NATO and U.S. defense organizations' expertise can be leveraged to assist in the ammunition and weapons production modernization efforts?

2. AMMUNITION AND WEAPONS CAPABILITIES

This chapter identifies and compares the types of ammunition and weapons currently fielded by the militaries of the NATO-16 members and the Czech Republic, Hungary, and Poland, within the broader framework of NATO enlargement and the interoperability and compatibility issues that this entails. We begin with a brief discussion of the current scope and configuration of NATO as a baseline for comparison. In addition to providing an overview of the types of weapon families and ammunition calibers recognized and fielded by the NATO-16, we discuss NATO interoperability and some existing experience that the three new NATO countries have gained from previous NATO cooperation. For each new member, we describe the government's posture toward NATO membership and the military's ability and approach to meeting identified interoperability requirements, including any role that has been specifically defined for the domestic defense industry in attaining interoperability and compatibility with NATO standards. In particular, we identify the types of ammunition and weapons fielded by the military in each of the three new member countries and compare these, as well as any soon-to-be-fielded ammunition and weapons, with those of the NATO-16.

A. NATO BASELINE

NATO enlargement involves an expansion of the territory that falls under the purview of this defensive alliance. The implication of this increased territorial scope is that all members, current and new, will have to possess the readiness to respond if a situation should arise. A complicating factor is the change in NATO doctrine since the early 1990s when, with the end of the Cold War, it could no longer plan with respect to a clearly defined enemy. Indeed, the need for this doctrinal shift is readily highlighted by the fact that the three new member countries were once absorbed within the political-military and economic sphere of influence of that clearly defined enemy, the Soviet Union. Thus, it is readily apparent that the world has become more complex in its multipolarity since the end of the Cold War and NATO's purpose and role have been evolving accordingly. In an effort to adapt to these new realities, NATO has adopted a new

objective: to be able to provide a rapid and flexible response to situations that may span the conflict spectrum from humanitarian and peacekeeping operations to a full-scale war.

1. Interoperability

Discussion of NATO interoperability to date has centered almost exclusively on command and control, communications, language, training, and air defense. When NATO has sought to determine what the new members are capable of bringing to the alliance, the focus has been on the larger issues of command and control or the military organizational structure. Interoperability with respect to the quality and safety of the new members' military equipment, such as ammunition and weapons, appears to have been placed on the back burner and even discouraged to some extent. For example, the Chief of Staff of the Hungarian Armed Forces indicated that U.S. negotiators had placed the "emphasis ... on the education and training of military personnel rather than the modernization of military technology."¹ Similarly, an official from within the Polish National Defence Ministry for Security Policy was also left with the impression that since NATO interoperability on all levels cannot happen immediately, funding for large armament buys should be postponed until the broader issues of command and control, communications, and language have been adequately addressed.²

While achieving interoperability in the above-mentioned areas is key to the successful, long-term integration of the new members' forces into the NATO command structure, the need to bring their equipment up to NATO standards should also be addressed. Having entered into membership, these countries need to possess the equipment necessary to allow them to work safely and successfully alongside NATO-16 members' troops. Ensuring the safety and quality, as well as compatibility and interoperability, of specific equipment such as ammunition and weapons could prove vital to the new member countries' performance in NATO operations. Furthermore, the modernization and replacement of ammunition and weapons would appear to be an area in which interoperability and compatibility benefits could be reaped quickly and cheaply—at least relatively speaking—if given the proper level of attention.

¹ "Hungary: United States Backs Hungarian Armed Forces Reform," *Daily Report*, FBIS-EEU-98-161, 10 June 1998.

² "Poland: Defense Ministry Official on U.S., NATO, Army," *Daily Report*, FBIS-EEU-98-028, 28 January 1998.

2. Cooperation Experience

While it remains to be seen how each of the new members' forces will contribute as NATO members, the performance and capabilities of the Czech, Polish, and Hungarian armed forces are hardly unknown. In fact, all three countries have been engaged in the various levels of cooperation provided through NATO-related forums, such as the North Atlantic Cooperation Council (NACC), Partnership for Peace (PfP), Euro-Atlantic Partnership Council (EAPC), and even the NATO membership accession talks, since the beginning of the 1990s. Their participation in the work of these organizations has exposed them to NATO or Western militaries, including their procedures, equipment, and command structures, while allowing NATO-16 members to review and evaluate these proposed new members. On the one hand, a 1994 joint British and Hungarian Partnership for Peace (PfP) exercise appeared to bolster arguments for the status quo with regard to the focus of interoperability efforts when it was noted that language barriers and different staffing and command structures seemed larger obstacles than those presented by any specific equipment interoperability.³ On the other hand, the Czech Republic's experience in Bosnia through Implementation Force/Stabilization Force (IFOR/SFOR) specifically highlighted a NATO incompatibility issue directly related to the use of different weapons, and therefore, ammunition caliber.⁴

3. Ammunition and Weapons Fielded

It would be an oversimplification to state that all NATO-16 members field a uniform set of ammunition and weapons; the reality is that each member possesses or has the freedom to field its own types and brands of ammunition and weapons. For purposes of compatibility and interoperability, however, NATO has sought to provide a standard for ammunition and weapons to be fielded, or at the very least a way to compare types and brands from one member to the next. In general, these efforts appear to have initially been structured based on the caliber of ammunition and weapons.

Table 2-1 lists the types of ammunition calibers and weapon families recognized and used by NATO-16 members. This table is based on the "Revised AOP-6 Structure"

³ Jeffrey Simon, "Chapter 1 – NATO Expansion," *Central European Civil-Military Relations and NATO Expansion*, McNair Paper 39, National Defense University, Institute for National Strategic Studies, April 1995, p. 7 (from printout).

⁴ "Service Branches Face Fight Over Resources in Modernisation Efforts," *Jane's Defense Weekly*, Country Briefing – The Czech Republic, 20 May 1998, p. 22.

Table 2-1. Revised AOP-6 Structure
(XXX Defines Weapon Family and Ammunition Caliber)

	Small Caliber	156	105mm	312	DRAGON
100	Small Arms	158	120mm	320	S-S Heavy AT
104	5.56mm Rifle	160	140mm	322	TOW
105	5.56mm MG	170	Artillery	324	SWINGFIRE
106	7.62mm Rifle	172	75mm	330	Field Artillery
107	7.62mm MG	174	105mm	332	MLRS
108	.30 cal Rifle	176	155mm	334	LANCE
109	.30 cal MG	178	175mm	336	ATACMS
110	7.65mm	180	203mm	340	Surface to Air
112	9.00mm	190	Artillery Fuses	342	BLOWPIPE
114	.38 cal	192	PD	344	REDEYE
116	.45 cal	194	MT	346	STINGER
118	.50 cal MG	196	MTSQ	352	JAVELIN
119	.50 cal spt	198	ET	354	CHAPARRAL
120	Medium Caliber	200	VT	356	ADATS
122	20mm x 139		Other Weapons	358	HAWK
123	20mm x 102	220	Recoilless Rifles	362	PATRIOT
124	25mm	222	57mm	384	HYDRA ROCKET
126	30mm	224	57mm	392	HONEST JOHN
128	35mm	226	84mm	394	NIKE-AJAX
130	40mm L/60	228	90mm	396	NIKE-HERCULES
131	40mm L/70	230	106mm		Engineer Items
132	40mm High Velocity	240	Grenades	400	Mines
134	40mm Low Velocity	242	Hand	500	Explosives & Demo.
	Large Caliber	244	Rifle	500	Igniters
140	Mortars	246	Launched	510	Fuzes
142	60mm	248	Bomblet	520	Blasting caps
144	81mm		Missiles and Rockets	530	Detonating Cords
146	107mm	300	S-S Light AT	540	Demolition Blocks
148	120mm Smooth Bore	302	66mm LAW	550	Demolition Charges
149	120mm Rifled Bore	304	84mm AT-4	560	Demolition Kits
150	Tank Guns	306	89mm (3.51)	570	Shaped Charges
152	76mm	308	MILAN	580	Miscellaneous
154	90mm	310	S-S Medium AT		

table contained in the *Catalogue of Ammunition Held by Nations that Satisfy Interchangeability Criteria of Form, Fit and Function Only*, a document that provides members with a database through which to identify comparable ammunition calibers and weapons across the armed forces of its members.⁵ This catalogue resource consists of all ammunition calibers and weapons families fielded by two or more NATO members. Coverage of *all* ammunition fielded by NATO members is contained in the NATO Ammunition Data Base (see Chapter 4).

B. NEW NATO MEMBERS

For each of the three countries entering NATO, this section includes a discussion of their government's posture toward NATO membership and their defense reform approach. A table that lists the types of ammunition and weapons fielded by the subject country's military follows each discussion.

1. The Czech Republic

Table 2-2 shows the Czech Republic's recent trends in defense expenditures. The Czech government has established its commitment to increase the defense budget through the year 2000, when spending should reach 2 percent of gross domestic product (GDP).⁶ It has been the Czech government's policy to strive for capping the defense budget below 2.5% of GDP.⁷ During this time period, the Czech Republic will be embarking on the reorganization and modernization of its armed forces, both to improve its defense capabilities and to address the compatibility and interoperability issues associated with NATO membership. Priorities for the Czech Army Forces by 2003 have been laid out to include—

- Reducing the military's size for increased flexibility and ability to react rapidly
- Increasing the degree or proportion of professionalism in the military

⁵ Section 500, Explosives and Demolition, is more comprehensively covered in Allied Ordnance Publication AOP-19, *Land Forces Explosives and Demolition Accessories Interchangeability Catalogue in Wartime*.

⁶ "Czech Statement on Vote of Confidence," *Daily Report*, FBIS-EEU-98-230, 18 August 1998.

⁷ "Czech Republic," *European Diversification and Defense Market Assessment Guide*.

- Reorganizing the military⁸

Given that ammunition and weapons upgrades and replacement are not listed among the top priorities, they will most likely have to compete vigorously for the limited funds available through the Czech Republic's defense budget.

Table 2-2. Czech Republic Defense Expenditure Trends
(\$ billions, 1995 Prices and Exchange Rates)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Defense Expenditures	N/A	N/A	N/A	1.031	0.965	0.900	0.902	0.880	N/A
Defense Expenditures as Percent of GDP	N/A	N/A	N/A	2.5	2.3	1.9	1.8	1.9	N/A

Notes: No defense expenditure figures available prior to 1993 because the Czech Republic was still part of Czechoslovakia.

Source: *SIPRI Yearbook*, 1998.

“The Czech Army is being transformed from a Warsaw Pact model to a corps/brigade-based, rapid deployment force along NATO-compatible lines.”⁹ Indeed, the Czech Republic has, as recently as 1994, expressed its commitment to NATO through the establishment of a Rapid Deployment Brigade, which was intended to represent the Czech Republic’s forces of the future. Originally 3,000 strong, this brigade was earmarked from the start to be equipped for compatibility of Czech forces with NATO exercises.¹⁰ The Czech Republic’s development of this brigade, during a time of budgetary constraints, clearly signaled its commitment to NATO. The Czech Rapid Deployment force is planned to grow through 2003, and by the time of the Czech Republic’s entrance into NATO, this brigade will be capable of deploying in conjunction with NATO troops within 10 days.¹¹

From 1993 to 1997, the Czech military’s demand for items from the domestic defense industry declined as signaled by a 30 percent decrease in contracts.¹²

⁸ “Service Branches Face Fight Over Resources in Modernization Effort,” p. 22.

⁹ “Czech Republic,” *European Diversification*.

¹⁰ Jeffrey Simon, “Chapter 7 – The Czech Republic,” *Central European Civil-Military Relations and NATO Expansion*, Institute for National Strategic Studies, National Defense University, McNair Paper 39, April 1995, p. 4 (from printout).

¹¹ “Czech Republic: Prague to Earmark Rapid Deployment Force for NATO in 1999,” *Daily Report*, FBIS-EEU-98-180, 29 June 1998.

¹² “Poland: Defense Industries in East Europe,” *Daily Report*, FBIS-EEU-98-082, 1 March 1998.

Furthermore, the Czech military has at times made the Czech defense industry uncertain by wavering in its support of Czech defense industry products and perhaps even indicating aspirations for Western-produced products.¹³ Recently, however, the Czech government has seemed to realize the important role that the Czech defense industry will have to play in modernizing the Czech military and bolstering the overall economy. Accordingly, it has promoted an environment to strengthen the Czech defense industry.¹⁴ "Domestic content will weigh heavily in purchasing decisions. Ideally, the MOD (Ministry of Defence) would like to see foreign suppliers transfer technology and manufacturing capability to local joint ventures."¹⁵ Table 2-3 contains an accounting of several armament systems—all of which address NATO compatibility and can be manufactured domestically—that the Czech Army plans to procure.

Table 2-3. Czech Republic Army Requirements

System	Number	NATO Compatible	Manufactured Indigenously	Manufactured Under License	Start/Stop Dates	Status
Czech T-72 MBT Upgrade Program	542	Yes	Yes	Yes	1995–2000	Underway
Czech RM-70 MLRS Upgrade	?	Yes	Yes	Yes	1997–2007	Underway
Upgrade the DANA SP Artillery to 155mm	?	Yes	Yes	No	1997–2000	Underway
Czech Strop SP AAA	?	Yes	Yes	Yes	1997	Under Discussion

Source: Steven J. Zaloga, *Czech Republic*, International Defence Briefing, Teal Group Corporation, July 1998.

Table 2-4 lists the ammunition and weapons fielded by the Czech Republic's military. Basic information was initially compiled from a section on the Czech Republic in the June 1997 edition of *Jane's World Armies* and then supplemented with information

¹³ Yudit Kiss, *The Defence Industry in East-Central Europe: Restructuring and Conversion*, New York: Stockholm International Peace Research Institute, Oxford University Press, p. 55.

¹⁴ "Czech Republic: Czech Statement of Vote of Confidence," *Daily Report*, FBIS-EEU-98-230, 18 August 1998.

¹⁵ "Czech Republic," *European Diversification*.

obtained by David R. Markov, who follows and studies the equipment of foreign militaries as well as the international arms market. Therefore, where possible, the table indicates whether the equipment has been produced using Western or Eastern manufacturing practices as well as by the Czech domestic defense industry.

Table 2-4. Fielded Equipment and Related Ammunition: The Czech Republic

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in the Czech Republic
ARMOUR			
<i>General</i>			
T-72M1 MBT		X	X
T-55AM2 MBT		X	X
T-72K		X	X
T-55K		X	X
BVP-1 IFV		X	X
<i>Command Vehicles</i>			
BVP-2 IFV		X	X
BVP-1K		X	X
BRM-1K		X	X
BPzV APC		X	X
<i>Armoured Recovery Vehicles</i>			
OT-90 APC		X	X
FREM-1		X	X
<i>Armoured Bridgelayer</i>			
FREM-4		X	X
VT-55		X	X
INFANTRY			
<i>Pistols</i>			
7.62 mm CZ 52		X	X
7.65 mm CZ 83		X	X
<i>Submachine Guns</i>			
7.62 mm Skorpion		X	X
7.62 mm vz/23		X	X
<i>Rifles</i>			
7.62 mm vz/58		X	X
5.45 mm AK74		X	X

Table 2-4. Fielded Equipment and Related Ammunition: The Czech Republic (continued)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in the Czech Republic
<i>Machine Guns</i>			
7.62 mm vz/59		X	X
12.7 mm DShK		X	X
12.7 mm NSV		X	X
<i>Mortars</i>			
81 mm M48		X	X
81 mm M52		X	X
120 mm M43		X	X
120 mm M1982		X	X
<i>Anti-Tank</i>			
RPG-75		X	X
82mm RCL M59		X	
9K11 (AT-3)		X	
<i>Anti-Tank Missiles</i>			
9M148 (AT-5)		X	
ARTILLERY			
<i>General</i>			
152 mm Dana SP Howitzer		X	X
122 mm D-30 Howitzer		X	
122 mm M-30 Howitzer		X	
100 mm M-53 Howitzer		X	X
122 mm RM-70		X	X
<i>Rocket Launcher</i>			
122 mm 2S1 Gvordik		X	X
<i>SP Gun</i>			
120 mm M1982		X	
ARMY AVIATION			
<i>General</i>			
Mi-24D attack		X	
Mil Mi-8/17 assault		X	
Mi-172 Hip airborne early warning		X	
Mi-9 command		X	
P21 Mi-2 utility		X	
Mi-2 combat support		X	

Table 2-4. Fielded Equipment and Related Ammunition: The Czech Republic (concluded)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in the Czech Republic
AIR DEFENSE			
<i>Light Anti-Aircraft Guns</i>			
57 mm S-60		X	
30mm M-53/59		X	
Strela 2 (SA-7) man-portable SAM		X	
<i>Low-Altitude SAMs</i>			
Nudelman (SA-9)		X	
Strela 10 (SA-13)		X	
LOGISTIC			
<i>Recovery Vehicles</i>			
VT-55A ARV		X	X
MT-55 ARV		X	X
WPT-TOPAS ARV (OT-62A chassis)		X	X
VPV ARV (BMP-1 chassis)		X	X
AD-90 (6x6)		X	X
MT-55A AVLB		X	X
AM-50 (6x6)		X	X
<i>Mechanized Bridge</i>			
UAZ-469B 600 kg (4x4)		X	
Praga V3S 3,000 kg (6x6)		X	X

2. Hungary

Table 2-5 shows Hungary's recent trends in defense expenditures. The Hungarian government has committed to raising the defense budget to 1.8 percent of GDP by 2001.¹⁶ During this period and on into the first decade of the 21st century, the Hungarian armed forces will be undergoing change in an attempt to become fully compatible with NATO. As in the Czech Republic, Hungary's initial efforts to address NATO compatibility have focused on such areas as communications, command and control, and air defense.

¹⁶ "Hungary: Army Modernized in Spirit of NATO Membership," *Daily Report*, FBIS-EEU-98-043, 12 February 1998.

Table 2-5. Hungary Defense Expenditure Trends
 (\$ billions, 1995 Prices and Exchange Rates)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Defense Expenditures	1.284	0.987	0.910	0.819	0.694	0.612	0.554	0.530	N/A
Defense Expenditures as Percent of GDP	2.5	2.2	2.1	1.9	1.6	1.6	1.6	1.7	N/A

Source: *SIPRI Yearbook, 1998*.

Hungary, however, perhaps more than either of the other two new member countries, appeared to have recognized early on the need to update its military technology. The reasoning behind this slightly different perspective can perhaps be found in Hungary's historical background. As a consequence of Hungary's 1956 uprising, the Soviet Union marginalized Hungary as a potential threat to the Soviet Union's authority within the Eastern bloc system and the Warsaw Treaty Organization (WTO) by ensuring that the Hungarian military was equipped with old and even outdated equipment.¹⁷ Hungary was also relegated to playing a more peripheral role in the formulation of WTO strategy.¹⁸ Today, even high-ranking officials within the armed forces acknowledge that Hungarian military equipment must be replaced and modernized not because of having to meet a NATO membership prerequisite, but because some of it is 15 to 20 years old.¹⁹

In 1995, the Hungarian National Assembly passed its first resolution on the transformation of the Hungarian military to be completed by 2005.²⁰ This early transformation centered on structural changes to the Hungarian military's organization and size. As of 1998, however, a Defence Ministry spokesperson indicated that qualitative changes, rather than further reductions in force strength, would become the focus of Army reform.²¹ This new qualitative orientation to the Hungarian military's reform specifically refers to "the acquisition of appropriate qualification and purchase of

¹⁷ Kiss, p. 104.

¹⁸ Ibid.

¹⁹ "Hungary: Army Commander Vegh Discusses Restructuring, NATO," *Daily Report, FBIS-EEU-98-054*, 23 February 1998.

²⁰ "Hungary: Officials Discuss Army Reform, NATO Compatibility," *Daily Report, FBIS-EEU-96-098*, 19 May 1996.

²¹ "Hungary: Spokesman Previews Hungarian Army Tasks for 1998," *Daily Report, FBIS-EEU-98-005*, 5 January 1998.

advanced military technology.”²² It is during this identified qualitative reform phase that Hungarian officials may find themselves evaluating the best means by which to modernize and replace their ammunition and weapons.

Although Hungary has made it clear that it recognizes the necessity of replacing equipment independent of its goal of NATO membership, special care should be taken to ensure that the results of these activities are at least complementary to NATO interoperability and compatibility. Because no major purchase in military technology has been made since the early 1980s, it is particularly important to adequately define the needs of the Hungarian armed forces,²³ including the consideration of the implications of Hungary’s NATO membership. In other words, equipment should not be purchased in isolation or without taking into consideration its impact on NATO interoperability. For example, in the early to mid-1990s, Hungary was seeking to fulfill its need for an enhanced or upgraded tank capability by pursuing the purchase of T-72 tanks from Belarussia. This would have immediately resulted in a NATO interoperability problem since these tanks use 125mm shells while comparable NATO tanks use 140mm shells.²⁴

Hungary may be able to avoid or at least better address these NATO interoperability and compatibility issues by turning to the West for the upgrade and replacement of equipment, as it appears to have done with its decision to order Mistral missiles from the French-British Matra Bae Dynamics company.²⁵ Table 2-6 contains an accounting of several armament systems that the Hungarian Army plans to procure. Some address NATO compatibility and/or can be manufactured domestically. Officials within the domestic defense industry have bemoaned the fact that the local defense production capabilities have been “two to three generations ahead of equipment used by the national armed forces,” at least in the past.²⁶ Therefore, the knowledge, expertise, and production capabilities of the Hungarian defense industry could possibly be leveraged to more efficiently and cost-effectively address the modernization and replacement of Hungary’s military equipment, including ammunition and weapons.

²² “Hungary: Keleti Views SFOR’s Future NATO Membership Preparations,” *Daily Report*, FBIS-EEU-98-012, 12 January 1998.

²³ “Hungary: Army Chief on Need to Replace Military Technology,” *Daily Report*, FBIS-EEU-98-234, 22 August 1998.

²⁴ “Hungary: Officials Discuss Army Reform, NATO Compatibility.”

²⁵ “Hungary: Army Modernized in Spirit of NATO.”

²⁶ Kiss, p. 104.

Hungary should evaluate the role that the Hungarian defense industry might be able to play in the upgrade and replacement of Hungary's military equipment, especially in the lower-level items like ammunition and weapons. Indeed this need has been addressed somewhat by the Hungarian government's creation of the Defence Industry Office (DIO) under the Ministry of Industry and Trade.²⁷ The DIO oversees and promotes the revitalization of the Hungarian defense industry. "The Government's reconstruction strategy will include solutions on how to better match domestic supply and demand, and how to make the Hungarian Defence Industry more competitive in foreign markets, mainly by ensuring that products are compatible with NATO equipment."²⁸

Table 2-6. Hungarian Army Requirements

System	Number	NATO Compatible	Manufactured Indigenously	Manufactured Under License	Start/Stop Dates	Status
French Matra Mistral Purchases	?	Yes	YES-Some	No	1997	Underway
Belarus T-72s MBTs	100	No	No	No	1997	Finished
Russian BTR-80s	200	No	No	No	1994	Finished
Chinese APCs	100	No	No	No	1994	Finished
British APCs	?	Yes	No	No	1993	Discussions
Upgrade MBT	?	Yes	?	?	1998	Under Study
Upgrade Towed and SP Artillery	?	Yes	?	?	1998	Under Study

Source: Steven J. Zaloga, *Hungary, International Defence Briefing*, Teal Group Corporation, July 1998.

Table 2-7 lists the ammunition and weapons fielded by the Hungarian armed forces. Basic information was compiled from a section devoted to Hungary in the November 1997 edition of Jane's World Armies and then supplemented with information obtained by David R. Markov who follows and studies the equipment of foreign militaries as well as the international arms market. In addition, where possible, the table

²⁷ "Hungary," *European Diversification and Defense Market Assessment Guide*.

²⁸ Ibid.

indicates whether this equipment has been produced using Western or Eastern manufacturing practices, as well as by the Hungarian domestic defense industry.

Table 2-7. Fielded Equipment and Related Ammunition: Hungary

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Hungary
ARMOUR			
<i>General</i>			
T-72 MBT		X	
T-55 MBT		X	
FUG D-442 recce		X	X
BMP-1 AIFV		X	
BMR-1K AIFV		X	
MT-LB APC		X	
MT-LB type APC		X	
BTR-80 APC		X	
FUG D-944 APC		X	X
INFANTRY			
<i>General</i>			
7.62 mm M48 rifle		X	
7.62 mm AK47 assault rifle		X	X
7.62 mm AKM assault rifle		X	X
7.62 mm AMD assault rifle		X	X
7.62 mm RPK light machine gun		X	
7.62 mm PK, PKB, PKS machine gun family		X	
12.7 mm DShK heavy machine gun		X	
2K15/2M2 (AT-1) anti-tank guided missile		X	
9K11/9M14 (AT-3) anti-tank guided missile		X	
9K111/9M111 (AT-4) anti-tank guided missile		X	
9P148/9M113 (AT-5) anti-tank guided missile		X	
BRDM-2 Sagger TD anti-tank guided missile		X	
100 mm T-12 anti-tank gun		X	
85 mm D44 anti-tank gun		X	

Table 2-7. Fielded Equipment and Related Ammunition: Hungary (continued)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in the Hungary
73 mm SPG-9 recoilless rifle RPG 7V/7D rocket propelled grenade		X X	
ARTILLERY			
<i>General</i>			
152 mm M1943/D-1 Howitzer 122 mm M1938/M-30 Howitzer 152 mm D-20 gun-Howitzer 122 mm 2S1 self-propelled Howitzer 122 mm BM-21 multiple rocket system 120 mm 2B11 mortar 120 mm M120 mortar 120 mm M43 mortar 81 mm M37M mortar		X X X X X X X X	X X X X
ARMY AVIATION			
<i>General</i>			
Mi-24V attack/close support Mi-24D attack/close support Mi-8C/T light support Mi-17 light support Mi-2 liaison/search and rescue		X X X X X	
AIR DEFENSE			
<i>General</i>			
Strela-2/2M (SA-7) man-portable SAM Strela-3 (SA-14) man-portable SAM Mistral SAM 57 mm S-60 anti-aircraft gun 23 mm ZU-23-2 twin light anti-aircraft gun 23 mm ZSU-23-4 quad self-propelled AAG	X	X X X X X	

Table 2-7. Fielded Equipment and Related Ammunition: Hungary (concluded)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Hungary
LOGISTIC			
<i>Recovery Vehicles</i>			
T-54		X	
T-55 ARV		X	
BMP-1VPV		X	
<i>Mechanized Bridge</i>			
BLG-60 AVLB		X	
MTU AVLB		X	
TMM (6x6)		X	
<i>Trucks</i>			
UAZ-469B 600kg (4x4)		X	
Robur 1800 A 1800kg (4x4)		X	
Csepel D-566 5000kg (6x6)		X	X
Csepel D-564 4000kg (4x4)		X	X
IFA L60 3000kg (4x4)		X	X
IFA W50 3000kg (4x4)		X	X
Ural-375 4000kg (6x6)		X	
Ural-4320 4500kg (6x6)		X	
Tatra 148 14580kg (6x6) DCA		X	
665T 5000kg (6x6)		X	

3. Poland

Table 2-8 shows Poland's recent trends in defense expenditures. Throughout the 1990s, Poland's defense budget has had its ups and downs. However, with an economic upturn expected and steadily gathering momentum, Polish defense budgets will probably increase modestly over the next few years. According to the Polish Defence Minister, Janusz Onyszkiewicz, the defense budget levels in the near future will depend heavily on the fluctuation of Poland's GDP, which is expected to grow between 6.1% and 6.5%.²⁹ Any increase in GDP and then the defense budget will provide much-needed funding to start down the costly and time-consuming path toward achieving compatibility and interoperability with NATO. Despite these desired and anticipated defense budget increases, modernization of Poland's armed forces will be limited by Poland's objective

²⁹ "Poland's Place Within the Treaty," *Military Technology – MILTECH*, September 1998.

of freezing the portion of the funding available for new equipment acquisition at 10 to 22 percent of the overall defense budget.³⁰

Table 2-8. Polish Defense Expenditure Trends
(\$ billions, 1995 Prices and Exchange Rates)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Defense Expenditures	3.661	2.536	2.502	2.773	2.675	2.720	2.853	2.935	N/A
Defense Expenditures as Percent of GDP	2.7	2.3	2.3	2.6	2.4	2.3	2.8	3.1	N/A

Source: SIPRI Yearbook, 1998.

The 1997 agreement to accept Poland into NATO and Poland's recent membership will shape Polish arms purchases over the next several years. According to a recent interview with Janusz Onyszkiewicz, Minister of Defence of Poland, Poland is in the process of adapting and implementing over 60 NATO targets. Poland has prioritized its effort in a new 15-year plan incorporating these objectives. Poland's budget and NATO Target priorities include:

- Modernizing communications systems
- Building new command and control systems
- Developing a new air defense network and integrating it into NATO
- Re-equipping a portion of the Polish Army that could be employed as part of a NATO action

The forces to be transferred to the NATO Rapid Reaction Force are in the process of being equipped and trained to meet NATO standards.

Currently, Poland is armed almost entirely with ammunition and weapons compatible with the Warsaw Pact and not necessarily NATO. Therefore, some modernization and replacement programs are obviously needed, such as the effort to switch all infantry weapons to those matching NATO caliber ammunition and weapons. A need for action in this area is further reinforced by a Polish National Defence Ministry Report that concluded that the Polish armed forces have only enough ammunition for 15

³⁰ "Poland: Polish Army Assessed by NATO, SHAPE," *Daily Report*, FBIS-EEU-98-027, 27 January 1998.

days, whereas the NATO standard is 30 days.³¹ Furthermore, aside from potentially affecting the Polish military's ability to perform in NATO operations for an extended period of time, low ammunition inventories also have an impact on training in areas such as artillery, when one considers that NATO-16 countries' armed forces fires 30 to 40 missiles a year in training, while an individual involved with Polish artillery may only fire one missile per month.³²

Because of budget constraints, ammunition and weapons programs will have to compete with other programs, such as armored vehicles and air defense, in the prioritization of funding. In addition to the outright replacement of outdated equipment, the Polish army may also have to seriously weigh the cost-savings potential of modernization projects. In recent years, the government has supported purchasing new equipment such as the PT-91 (a local modification of the Russian T-72) and armored transporter rather than rebuilding existing equipment. However, given the tight nature of the defense budgets in the near future, interest in modernization is likely to become increasingly important over the next 5 years, driven largely by the need to meet NATO interoperability needs.

In addition, the issue of a future fighter and air defense structure for the Polish Air Force has been garnering most of the attention. Polish industrial officials have indicated in conversations with IDA personnel that the purchase of an F-16-type fighter aircraft will effectively force the government to commit virtually its entire annual procurement budget on this one program. Like the other two new NATO members, Poland faces an interesting dichotomy. It could most likely make strides toward meeting NATO interoperability and compatibility with respect to ammunition and weapons at comparatively low cost and in a rather brief time period, but the low cost of these items is probably why they receive lower priority on the list of items for modernization and replacement. Indeed, NATO seems to have reinforced this by highlighting certain key areas in which the new members should focus their activities to achieve interoperability and have indicated a willingness to remain flexible and accommodating with respect to the time necessary to attain interoperability and compatibility in these lower priority areas.

³¹ "Poland: Secret Ministerial Report on Army Condition, NATO Viewed," *Daily Report*, FBIS-EEU-98-021, 21 January 1998.

³² "Poland: State of Army's Preparations for NATO Viewed," *Daily Report*, FBIS-EEU-98-134, 14 May 1998.

To acquire new equipment the Polish military will have to evaluate whether to deal with domestic or foreign defense industries. Poland has already reconsidered some of its domestic programs tied to non-NATO countries. For example, the concept of integrating South African and Israeli equipment into the armed forces may have to be assessed in light of whether it will be compatible with NATO equipment (even if cheaper). Waiting in the wings to fill the void and allay any fears about interoperability with NATO are firms such as Boeing, Lockheed Martin, British Aerospace, and GIAT, which view Poland as a significant, relatively untapped market for Western arms. The importance of the Polish market and competition involved in capturing it was illustrated by the participation of over 220 firms (95 of which were foreign companies, representing 23 different countries) in the September 1998 International Defence Industry Exhibition (MSPO'98) that was held in Kielce, Poland, to underscore Poland's plans to join NATO and its needs in the area of better equipment integration with NATO.

In the upcoming years of modernization facing the Polish armed forces, the Polish government is likely to make efforts to support a certain number of core industries above other elements of the domestic defense industry. Indeed, some of this process has already taken place naturally as a result of an overall decline in the domestic demand for arms purchases to the point in 1997 that Polish domestic defense contracts were 60 percent of 1989 levels.³³ Poland did not formally document its plan for military restructuring until the release of the document *Assumptions of the Government Program for Modernizing the Armed Forces of the Polish Republic in the Years 1998–2012*. This document states that the Polish defense industry will be relied upon to meet the military's equipment and repair needs and that it will most likely have to make adjustments to ensure that the weapons fielded by the Polish armed forces are NATO interoperable.³⁴

As further encouragement to the Polish defense industry, there has been some talk of formulating a government policy on offsetting. Offsetting considers that if a foreign company wins a contract to supply arms to the Polish military, then some portion of the products should be manufactured in Poland, thus increasing production in Polish defense plants and gaining access to top-notch technology.³⁵ The Deputy Director of the Technical Directorate of the General Staff of the Polish Army has even gone so far as to

³³ "Poland: Defense Industries in East Europe," *Daily Report*, FBIS-EEU-98-082, 1 March 1998.

³⁴ *Ibid.*

³⁵ "Poland: Arms Sector Consolidation, Privatization Seen," *Daily Report*, FBIS-EEU-98-190, 9 July 1998.

say, "The government and the Polish armed forces should adopt as a standard the requirement that every kind of product supplied to the military include the contribution of the Polish engineer and worker."³⁶

The Polish government would like to rely on the domestic defense industry for its military modernization efforts; in fact, some of the more expensive projects originally slated to involve procurement from foreign sources have been placed on hold.³⁷ Poland's defense manufacturers satisfy 70 percent of the Polish armed forces' needs.³⁸ Table 2-9 outlines the Polish army's upcoming purchase of several armament systems, some of which address NATO compatibility and/or can be manufactured domestically. As Table 2-10 indicates, however, the Polish defense industry faces numerous Western and Eastern competitors for the award of these armament systems' manufacturing contracts.

Even with this commitment expressed by the Polish military, the Polish defense industry will have obstacles other than foreign competition to overcome in transforming its technology and practices so that it can produce equipment compatible with NATO standards. One thing that will compound the defense industry's efforts is the amount of funding allocated not only to the modernization of weaponry fielded, but to R&D in general. NATO-16 members spend roughly 30 percent of their defense budgets on weaponry modernization with nearly one-third of this amount (or 10% of the total defense budget) directed specifically to R&D, whereas Poland spends only 1 percent of its defense budget on R&D.³⁹ Efforts by the ammunition and weapons industry to modernize its production capabilities may be more specifically encumbered by the decision that this sector of the Polish defense industry forgo privatization, since it is of strategic importance to the Polish defense capability.⁴⁰ This industry sector therefore may miss out on foreign partnering opportunities that could provide access to Western manufacturing processes and quality and safety practices.

³⁶ "Poland: Reform of Polish Military Stressed," *Daily Report*, FBIS-EEU-98-155, 4 June 1998.

³⁷ "Poland's Place Within the Treaty."

³⁸ "Poland," *European Diversification and Defense Market Assessment Guide*.

³⁹ "Poland: Money Short in Poland for Military Science," *Daily Report*, FBIS-EEU-98-187, 6 July 1998.

⁴⁰ "Poland: Arms Industry Privatization Blueprint Outlined," *Daily Report*, FBIS-EEU-98-190, 9 July 1998.

Table 2-9. Polish Army Requirements

System	Number	NATO Compatible Ordnance	Manufactured Indigenously	Manufactured Under License	Start/Stop Dates	Status
New Self-Propelled Artillery Systems	94	Yes-155mm	Yes	Yes	1999-2012	Selection in 1999
New Wheeled Armored Personnel Carrier	720	Yes-25mm	Yes	Yes	1997-?	Selection in 1999
New Anti-tank Guided Missiles	800-1,600	Yes	Yes	Yes	1998-?	Selection in 1999
New LOARA/STALA GMIT Self-Propelled AAA	?	Yes-35mm	Yes	Yes	1998-2001	Selection in 1999
Upgrade of BMP-1 Infantry Fighting Vehicle	?	Yes-25mm	Yes	Yes	1996-?	Selection in 1999
Upgrade of BDRM Recce Vehicle	47	No-12.7mm	Yes	Yes	1999-?	Underway
Modernized T-72M (PT-91 Program)	140	No-125mm	Yes	No	1993-2003	Underway
Acquire 84mm Carl Gustaf Anti-Armor	?	No	No	No	1995-?	Underway
Upgrade of W-3W HUZAR Helicopter	80-100	No	Yes	Yes	1997-?	Selection in 1999

Source: Andrew W. Hull, David R. Markov, and Steven J. Zaloga, *MSPO '98: Kielce, Poland*, IDA Trip Report, September 1998, Working Draft.

Table 2-10. Competitors for Polish Ground Force Equipment Programs

System	Country	Manufacture	Manufactured Indigenously	Manufactured Under License
New Self-Propelled Artillery Systems	United Kingdom	Vickers	Hula Stalowa Wola	AS-90 turret on PT-91 chassis
	Germany	Wegmann	Hula Stalowa Wola	Pz-2000 turret on PT-91 chassis
	South Africa	Denel	Hula Stalowa Wola	T-6 turret on PT-91 chassis
	Slovakia	ZTS	Hula Stalowa Wola	ZUZANA turret on a PT-91 chassis
New Wheeled Armored Personnel Carrier	Austria	Steyr	Hula Stalowa Wola	Pandur APC
	Switzerland	Mowag	Bumar Labedy	Piranha APC
New Anti-tank Guided Missiles	Israel	Rafael	Mesko	NT-D (Dandy) ATGM
	Sweden	Saab Dynamics	Mesko	Bofors Bill 2 ATGM
	Europe	Euromissile	Mesko	HOT-3 ATGM
New LOARA/STALAGMIT Self-Propelled AAA	Ukraine	NII Kvant	Bumar Labedy	35mm guns w/Roland-5 missile on T-72
	South Africa	Denel	Bumar Labedy	35mm guns w/SAHV-3 missile on T-72
	Sweden	Celsius	Bumar Labedy	35mm guns w/BAMSE missile on T-72
	Israel	Rafeal	Bumar Labedy	35mm guns with missile on T-72
Upgrade of BMP-1 Infantry Fighting Vehicle	United States	GM Delco	Hula Stalowa Wola	GM Delco 25 mm turret on BMP-1 hull
Upgrade of BDRM Recce Vehicle	Poland	Ziskie	Siemianowice Ziskie	Several sensors from Western suppliers
Modernized T-72M (PT-91 Program)	Poland	Bumar Labedy	Bumar Labedy	PT-91/T-72M1Z export variant
Acquire 84mm Carl Gustaf Anti-Armor	Sweden	Celsius	No	No
Upgrade of W-3W HUZAR Helicopter	United States	Boeing	Yes	
	France	Aerospatiale	Yes	

Source: Andrew W. Hull, David R. Markov, and Steven J. Zaloga, *MSPO '98: Kielce, Poland*, IDA Trip Report, September 1998, Working Draft.

Table 2-11 lists the ammunition and weapons fielded by the Polish armed forces. Basic information was compiled from a section devoted to Poland in the November 1997 edition of *Jane's World Armies* and then supplemented with information obtained by David R. Markov, who follows and studies the equipment of foreign militaries as well as the international arms market. Therefore, where possible, the table indicates whether this equipment has been produced using Western or Eastern manufacturing practices, as well as by the Polish domestic defense industry.

Table 2-11. Fielded Equipment and Related Ammunition: Poland

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Poland
ARMOUR			
T-55 MBT T		X	X
T-72 MBT		X	X
58 PT-91 (T-72) MBT		X	X
BRDM-2 recce		X	
BMP-1 APCs		X	
OT-64 APC types		X	X
INFANTRY			
9 mm P-64		X	
9 mm Makarov		X	
9 mm PM-63		X	
5.45 mm AK74		X	
7.62 mm PMK		X	
7.62 mm PMK-DGN		X	
7.62 mm Dragunov SVD		X	
5.45 mm RPK-74		X	
5.56 mm ONYX 91	X		
5.56 mm TANTAL 90	X		
5.56 mm BERYL Assault Rifle	X		
7.62 mm RPD		X	
7.62 mm RPK		X	
7.62 mm PK, PKS		X	
14.5 mm KPV machine gun		X	
30 mm AGS-17		X	

Table 2-11. Fielded Equipment and Related Ammunition: Poland (continued)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Poland
ANTI-ARMOUR			
AT-3 Sagger ATGW		X	X
AT-4 Spigot ATGW		X	
AT-5 Spandrel ATGW		X	
AT-6 Spiral ATGW		X	
RPG-7V		X	
82 mm RCL B-10		X	
84 mm Carl Gustaf	X		
85 mm D-44		X	
ARTILLERY			
203 mm 2S7 self-propelled artillery		X	
152 mm Dana M-77 self-propelled artillery		X	
152 mm M-1938 (ML-20) towed arty		X	
122 mm 2S1 self-propelled artillery		X	X
122 mm M-1938 (M-30) towed artillery		X	
122 mm BM-21 multiple rocket system		X	
122 mm RM-70 multiple rocket system		X	
FROG-7		X	
120 mm M-120 mod .38/43 mortar		X	
120 mm 2B11/2S12 Sani mortar		X	

Table 2-11. Fielded Equipment and Related Ammunition: Poland (continued)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Poland
ARMY AVIATION			
Mi-24D combat		X	
Mi-24V combat		X	
PZL Mi-2 combat		X	X
PZL W-3W combat		X	X
PZL W-3 combat		X	X
Mi-85 communications		X	
Bell 412SP communications	X		
AIR DEFENSE			
SA-7 Grail man-portable SAM			
SA-16 Gremlin man-portable SAM			
SA-6 Gainful SAM			
SA-8 Gecko SAM			
SA-9 Gaskin SAM			
SA-13 Gopher SAM			
24 mm (twin) ZU-23 LAAG			
23 mm ZUR-23-2S Jod (with two SA-7 SAMs)			
23 mm ZSU-23-4 SPAAG			
57 mm S-60 AAG			
LOGISTIC			
<i>Armoured Engineer Vehicles</i>			
IWT CEV (T-55 chassis)		X	
MT-LB engineer reconnaissance vehicle		X	
<i>Recovery Vehicles</i>			
T-54/T-55 ARV		X	
WZT-3 ARV		X	
WPT-TOPAS ARV		X	
MT-LB technical support vehicle		X	X

Table 2-11. Fielded Equipment and Related Ammunition: Poland (concluded)

Equipment Category/Item	Western Manufacturing Practices	Eastern Manufacturing Practices	Produced Domestically in Poland
<i>Mechanized Bridges</i>			
BLG-67M2 AVLB		X	
SMT-1 (6x6)		X	
<i>Light Vehicles</i>			
UAZ-468B 600kg (4x4)		X	
<i>Trucks</i>			
Lubin-51 (4x2)		X	X
Robur LO 1800 A 1800kg (4x4)		X	
Star 66 2500kg (6x6)		X	X
Star 266 3500kg (6x6)		X	X
Star 244 5000kg (4x4)		X	X

C. NEW MEMBER AND NATO-16 MEMBER COMPARISONS

To simplify the process of comparing the new and NATO-16 members' soon-to-be fielded ammunition and weapons, this section will limit the scope to the following two areas:

- Small Caliber (small arms, medium caliber), Large Caliber (mortars, tank guns, artillery), and Other Weapons (i.e., recoilless rifles) as indicated for NATO
- Ammunition and weapons related to the infantry and artillery for the new member countries

Table 2-12 illustrates one representation of how these two categories intersect. The patterned cells represent those areas in which the Czech Republic, Hungary, and Poland lack a NATO-compatible ammunition or weapon type. Otherwise, the table indicates what these countries do have or will soon field that is potentially NATO compatible. Table 2-13 further expounds upon this relationship by indicating those new NATO member-fielded ammunition and weapons that are not compatible with NATO ammunition and weapons types. These tables provide the basis for general and specific findings that follow immediately after them.

We indicate NATO compatibility if one of the new members possesses ammunition or weapons that appear to match the ammunition caliber and weapons' families recognized by NATO and therefore are potentially compatible with NATO. We

recognize, however, that true NATO compatibility will need to be determined through the established procedures and processes designed by NATO for this purpose (more information on the process necessary for determining NATO compatibility can be found in Chapter 4).

Table 2-12. NATO-Compatibility of the Three New Members' Soon-to-be-Fielded Ammunition and Weapons

NATO	The Czech Republic	Hungary	Poland
SMALL CALIBER, SMALL ARMS			
5.56mm x 45mm and 5.56mm x M193 Rifle	5.56mm LADA/CZ-2000 assault rifle; 5.56mm LADA/CZ-2000 carbine	5.56mm NGM assault rifle	5.56mm BERYL assault rifle; 5.56mm ONYX 91 automatic carbine; 5.56mm TANTAL 90 automatic rifle
5.56mm x 45mm and 5.56mm x M193 MG	5.56mm LADA/CZ-2000 light machine gun		
7.62mm x 51 Rifle			
7.62mm x 51 MG	7.62mm UKT-95N universal tank machine gun; 7.62mm Rachot TK-98 tank machine gun; Rachot UK 68 machine gun	7.62 Skorpian sub-machine gun	
.30 cal or 7.62 mm x 63mm Rifle			
.30 cal or 7.62 mm x 63mm MG			
7.65 mm x 17SR or 7.65 mm x 21 Parabellum			
9mm x 19 Parabellum	CZ 9mm Model 75 pistol; CZ 75 Mod B/SD Tarantule pistol; CZ 9mm Model 85 pistol; CZ 9mm Model 100 and 101 pistols; 9mm Bulldog Model 58/98 and 58/98S submachine gun;	FEG 9mm Model P9 pistol; FEG 9 mm Model B9R pistol; FEG 9 mm Model P9R pistol; FEG 9mm Model P9RA pistol; FEG 9mm Model KGP9 submachine gun	9mm MAG-95; 9 mm GLAUBERYT PM-84P; 9mm VIS 35 Pistol
.38 US M41cal			
.45 ACP cal or 11.43 mm x 23			
.50 cal MG or 12.7mm x 99 MG	12.7mm Falcon OP-97 Sniper Rifle		

Table 2-12. NATO-Compatibility of the Three New Members' Soon-to-be-Fielded Ammunition and Weapons (concluded)

NATO	The Czech Republic	Hungary	Poland
.50 cal Spt or 12.7 mm x 77 Spotting Rifle			
MEDIUM CALIBER			
20mmx139			
25mm			
NATO	The Czech Republic	Hungary	Poland
30mm			
40mm	40mm (L60, L70, High Velocity, Low Velocity)		
LARGE CALIBER, MORTARS			
60mm	60 mm Commando Mortar		LM-60D Mortar; LM-60K Mortar
81mm	81mm M48 and 81mm M52	81mm M37M mortar	
107mm			
120mm	120mm M43 and 120mm M1982	120mm 2B11 mortar; 120mm M120 mortar; 120mm M43 mortar	120mm M-120 mod .38/48 mortar; 120mm 2B11/2S12 Sani mortar
LARGE CALIBER, TANK GUNS			
76mm			
90mm			
105mm			
120mm			
LARGE CALIBER, ARTILLERY			
75mm			
105mm			
155mm	155mm ERFB-BB artillery round		
175mm			
203mm			

Cross-hatching indicates that the new NATO member lacks a potential NATO-compatible ammunition or weapon type.

Table 2-13. New NATO Members' Non-NATO Compatible Ammunition Calibers and Weapons Families

The Czech Republic	Hungary	Poland
5.45mm AK74 Rifle	12.7mm DShK	5.45mm AK74
12.7mm DShK	152mm M1943/D-1 Howitzer	5.45mm RPK-74
12.7mm NSV	152mm 20 gun-Howitzer	152mm Dana M-77 self-propelled artillery
100mm M-53 Howitzer	122mm M1938/M-30 Howitzer	152mm M-1938 (ML-20) towed artillery
152mm Dana SP	122mm 2S1 self-propelled Howitzer	122mm 2S1 self-propelled artillery
122mm D-30 Howitzer	122mm BM-21 multiple rocket system	122mm M1938 (M-30) towed artillery
122mm M-30 Howitzer		122mm BM-21 multiple rocket system
122mm RM-70		122mm RM-70 multiple rocket system
122mm 2S1 Gvordik		

General Findings

- An initial look at compatibility between NATO-16 and the three new members depends essentially on the caliber of the ammunition and weapons.
- It would appear that the three countries' smaller caliber, small arms ammunition and weapons are potentially more NATO-compatible than those associated with the categories of medium to large caliber and artillery.

Small Arms – Infantry Focus

- The Czech Republic and Poland both field the non-NATO-compatible 5.45mm ammunition and weapons.
- All three of the new members are to field 5.56mm rifle ammunition and weapons.
- The Czech Republic also appears to field 5.56mm machine gun ammunition and weapons.
- All three of the new members are to field 9mm ammunition and weapons.
- Both the Czech Republic and Hungary appear to field non-NATO compatible 12.7mm ammunition and weapons.

- The Czech Republic fields a 12.7mm, which is comparable to the NATO .50 cal machine gun ammunition and weapons.
- None of the three new members appear to field ammunition and weapons corresponding to the .30cal, .38cal, and .45cal recognized and fielded by NATO-16 members.

Medium Caliber – Infantry Focus

- Only the Czech Republic fields something (40mm) potentially compatible with NATO in the medium caliber range.

Large Caliber/ Mortars – Infantry/Artillery Focus

- The Czech Republic and Poland field 60mm ammunition and weapons.
- The Czech Republic and Hungary both appear to field 81mm and 120mm ammunition and weapons.
- All three new members appear to field 120mm ammunition and weapons.
- None of the three new members appear to field ammunition and weapons corresponding to the 107mm caliber recognized and fielded by NATO-16 members.

Large Caliber/ Tank Guns – Infantry/Artillery Focus

- None of the three new members appear to field ammunition and weapons corresponding to the 76mm, 90mm, 105mm, or 120mm calibers recognized and fielded by NATO-16 members.

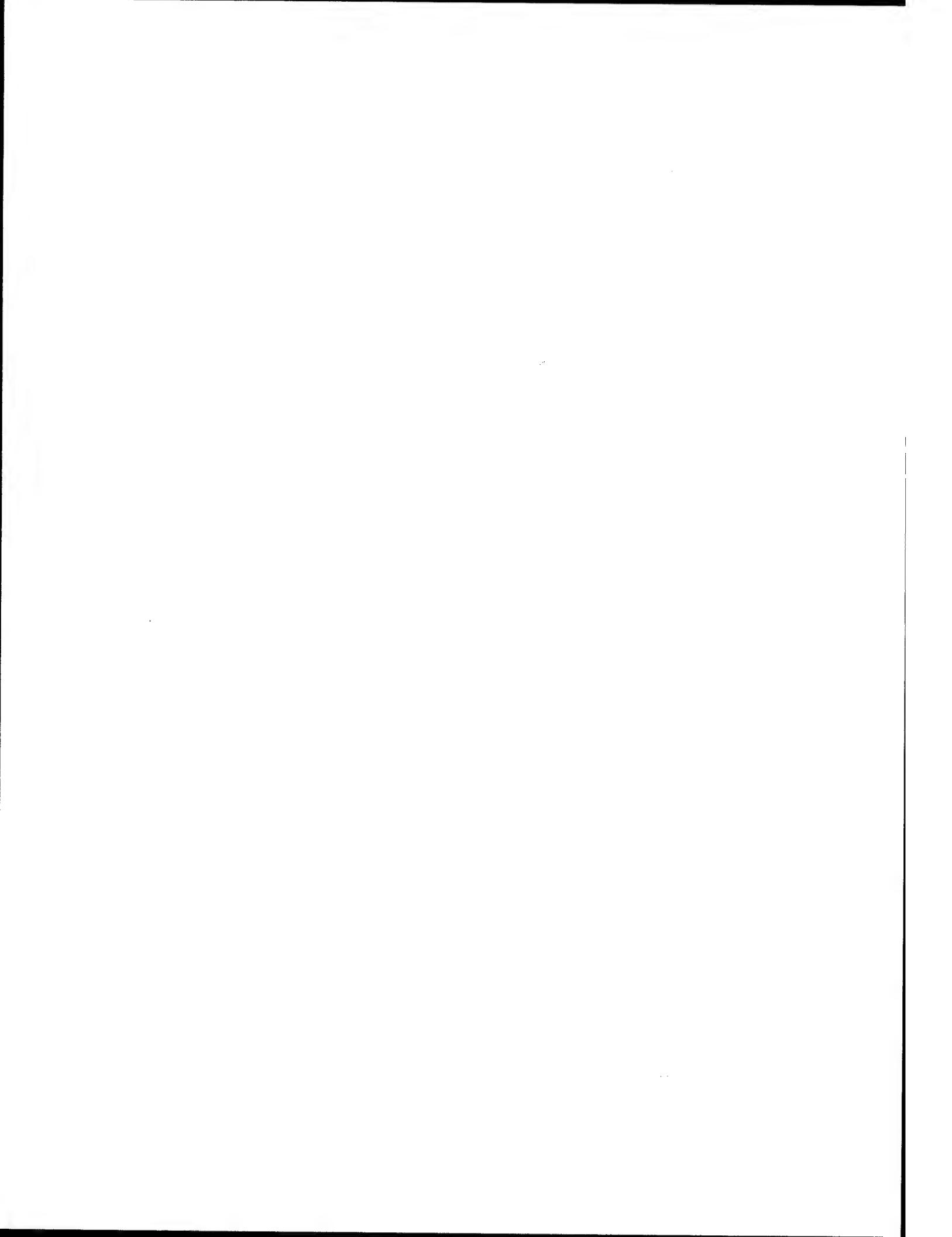
Large Caliber – Artillery Focus

- The Czech Republic is the only one of the three new members that appears to field at least one ammunition or weapon in this category (155mm).
- Otherwise, the new members and current NATO members appear to field completely different calibers in this area.
- All three new members field 122mm and 152mm ammunition and weapons.
- The Czech Republic also fields 100mm ammunition and weapons in this area.
- By contrast, NATO recognizes and fields the following ammunition and weapons calibers: 75mm, 105mm, 175mm, and 203mm.

The comparison of the calibers used by the three new member countries and NATO-16 is an important starting point for compatibility analysis.⁴¹ However, it is also

⁴¹ A mere match of calibers does not necessarily ensure compatibility. The ammunition and weapons' barrels must also be of the appropriate diameter.

important to consider that some of the fielded ammunition and weapons could be based on Soviet/Eastern bloc design and manufacturing or could be old and outdated. In the eyes of the present NATO members, there may be some question as to the reliability—and perhaps more importantly the quality and safety—of these products. Thus in upgrading and modernizing the new members' military ammunition and weapons, more must be done than merely matching calibers to NATO standards.



3. AMMUNITION AND WEAPONS MANUFACTURING CAPABILITIES IN THE ECE COUNTRIES

In *The Defence Industry in East-Central Europe: Restructuring and Conversion*, author Yudit Kiss comprehensively explores the defense industry of East-Central Europe. In addition to profiling the defense industries and their post-Cold War transformations in several of the countries of this region, Kiss provides some valuable background by explaining the influences that the command economy¹ structure and Eastern bloc political-military system placed on the planning, production, and output of these defense industries. This chapter summarizes some of these major points and addresses quality and safety in ECE defense industries. For each of the three new NATO members, we provide a defense industry overview as well as detailed information on domestic ammunition and weapons industry and manufacturers.

A. UNIQUE POSITION OF THE DEFENSE INDUSTRY IN EAST AND CENTRAL EUROPE

Defense industries, due to their central and privileged position within a command economy, were directly managed through a department in one of the state's ministries and generally enjoyed a high level of state protection that was not afforded to civilian industry. The philosophy during the Cold War was that the defense industry was so vital to the state and its interests that society as a whole would be willing to absorb its unique requirements and costs.

1. Characteristics of a Domestic Command Economy

Through its privileged status, the defense industry had access to special financing and subsidies. The defense industry had priority for obtaining additional resources and was, in fact, required to maintain raw material and parts reserves that could be implemented quickly to increase production levels if necessary. A specific segment of

¹ A command economy is organized by a central authority. This central authority makes decisions on what and how much to produce rather than leaving it up to the free reconciliation of supply and demand in a market economy.

the subcontractor base was also required to work for the defense industry. The defense industry had access to loan and capital amounts not normally available to non-defense industry sectors. Managers and even some engineers within the defense industry were allowed to travel to the West for trade fairs and to even purchase equipment at a time when this would have been unheard of for their counterparts in the civilian sector. The defense industry benefited from R&D programs that were run by independent companies or more central military organizations. The defense industry also introduced quality-control systems into their military production processes.

2. Characteristics of the Eastern Bloc System

In addition to being influenced by their command economies, the defense industries in ECE states were also shaped by their experience within the Soviet dominated Eastern bloc economic, political, and military/defense system. The Soviet Union played a central role in the production activities of the ECE states' defense industries, whether it was issuing licenses to produce products based on Soviet design or maintaining involvement in the direction of military R&D. ECE defense manufacturers were also sometimes given the job of producing parts—rather than whole products or systems—so that employees did not necessarily know or fully understand the end use or intent. Furthermore, within the Soviet sphere of influence, some Eastern defense industry researchers were tasked to study NATO military technology, largely to determine how to make Western-style equipment interface with Warsaw Pact-style equipment.²

Because of the great demand generated by the need to create and maintain the Warsaw Pact's military capabilities, ECE defense industries were generally much larger than would be necessary to meet their domestic military needs. Furthermore, as a means to meet high levels of demand and avoid becoming too dependent upon one state's defense industry for the production of a particular product or system, the Soviet/Warsaw Pact system encouraged the establishment of parallel production facilities in different ECE states.

3. Implications for the ECE Countries' Present Transition

The ECE defense industries' experience within their domestic command economies and the Soviet dominated Eastern bloc have implications for their present

² Tom Cohen, "Reversal of Loyalties Unites Former Foes," *AP Online*, 6 March 1999.

situations and how well they will be able to transition to producing quality ammunition and weapons that are NATO interoperable. On the one hand, because of their historically privileged position, ECE defense industries have had access to financing and capital, which has allowed them to obtain more internationally competitive equipment than could be found in the ECE civilian industries of the time. When defense industry managers and engineers were allowed to travel to the West, they gained knowledge of and access to Western manufacturing practices, technology, and products. Indeed, the ECE defense industries' technological levels are thought to have benefited from their experience in imitating the West. Furthermore, the military markets had more demanding quality requirements. Therefore, compared with the ECE civilian industrial sectors, the defense industries were more technologically advanced and familiar with Western style production and practices. On the other hand, the defense industry's privileged position also left it perhaps less prepared to function in the new post-Cold War political and economic environment. Because the defense industry was allowed priority access to funding and resources, it never really had to function based on true efficiency or competition. In addition, the production capacities were generally underutilized. Because of Soviet influence and Eastern bloc needs, each of these countries built a defense industry that is much larger than needed to meet domestic military needs. This excess size could prove cumbersome as domestic defense demand shrinks or at least remains uncertain and competition within world arms markets increases. For example, the ECE states often have parallel production facilities and now find themselves in competition with one another.

B. QUALITY AND SAFETY IN ECE DEFENSE INDUSTRIES

During several months of research, very little information could be located on the issues of quality and safety of the manufacturing practices and products of the ECE defense industries, both collectively and independently. The only extensive coverage of this subject could be found in Kiss' *The Defence Industry in East-Central Europe*. Therefore, this section of the report again relies rather heavily on his research and observations made on quality and safety with respect to the ECE defense industry.

Perhaps because the defense industry has prevailed as a sector of strategic importance or because industry has accorded higher priority to the military user than to the civilian customer, ECE countries have a history of being able to meet more stringent technical and quality standards in military production than in the civilian industrial

sector. Systems for quality control, with multi-phase inspections performed by industry and military specialists, have been considered integral to the production of military products. Indeed, quality was more frequently addressed in defense rather than civilian production because the costs of implementing a quality control system were more easily absorbed. “Although this made production slower and more costly than for the average civilian product, it was compensated by the higher prices enterprises received for their military output. In civilian enterprises, on the other hand, in the rare cases where there was genuine quality control it usually came at the end of the production process with the rejection of damaged items.”³ In other words, civilian industry did not integrate quality practices into the entire production process to *prevent* failures, defects, scrap, and rework. Therefore, in most cases it proved too costly for implementation.

In addition to quality experience, the ECE defense industries also implemented some special safety features, most likely out of necessity. Such efforts to address safety through the positioning of plants, transportation arrangements, storage, and laboratory procedures were particularly characteristic of the ammunition and weapons sector.

The ECE defense industries can continue to leverage their experience with quality and safety in the production of products for their domestic militaries and exports. Facing increased real-world competitive pressures, however, these countries may be forced to finally face up to the costs of their quality and safety procedures. To truly shave costs and increase competitiveness, they may perhaps look to Western experience for examples and advice on how to more efficiently and cost-effectively inject modern quality and safety processes into the production process for military products.

C. THE CZECH REPUBLIC

1. Defense Industry Overview

The Czech Republic, as part of the former Czechoslovakia, was one of the top arms producers within the Warsaw Pact and even enjoyed success as a major world arms exporter. Despite the Czech Republic’s traditionally having a strong and respected defense industry, it declined especially during the early 1990s. Table 3-1 displays some important economic indicators representative of this decline.

³ Kiss, p. 137.

Table 3-1. Key Indicators in the Downsizing of the Czech Republic's Domestic Defense Industry

Export Revenues	\$350–380 million in 1990, but only \$270 million in 1993
Number of Firms	58 in 1993, but only 47 in 1997
Size of Arms Output	60 to 70 percent of 1991 levels
Defense Industry Employment	25,000–30,000 in 1993, but only 20,000–22,000 in 1997

Compiled from "Poland: Defense Industries in East Europe," *Daily Report*, FBIS-EEU-98-082, 1 March 1998.

Despite these declining trends, the Czech Republic's defense industry has remained viable and competitive in the international market. For example, in 1997, military exports still equaled \$182 million and Czech defense products were exported to over 60 different countries worldwide.⁴ The adjustment and restructuring of the Czech defense industry has also progressed in a relatively successful and evolutionary fashion owing to a number of contributing factors:⁵

- The Czech Republic's government rather quickly defined the Czech military's equipment needs.
- The Czech domestic defense industry maintained its access to debt relief, subsidies, and low interest loans that more than likely assisted in cushioning the blow of its transition to operating in the competitive nature of a market economy.
- The government also made a conscious decision to encourage and promote the export of Czech arms production.
- Investment was made available for the Czech defense industry to modernize its manufacturing machinery and equipment, as well as concentrate on R&D.
- Links and relationships were established with top arms manufacturers outside the Czech Republic who had connections to NATO and the EU.

In addition to these factors, the Czech Republic has seen a trend whereby multiple manufacturers pool together to establish holding companies for a much more holistic approach to defense manufacturing. The three major consortia or holding companies associated with the Czech defense industry are Aero Holding, RDP, and Omnipol.⁶

⁴ "Czech Republic: Czech '97 Surplus in Arms Trade Reaches \$150 Million," *Daily Report*, FBIS-EEU-98-105, 15 April 1998.

⁵ "Poland: Defense Industries in East Europe," *Daily Report*, FBIS-EEU-98-082, 1 March 1998.

⁶ "Czech Republic," *European Diversification and Defense Market Assessment Guide*, September 1997.

These arrangements integrate manufacturing facilities, R&D laboratories, and financial organizations to generate the necessary capital and utilize advanced technology in order to make Czech arms products more visible and competitive in international markets.⁷ The Omnipol holding company has traditionally dealt specifically with military materiel, which includes "infantry weapons and ammunition (including NATO standard) for army and police use; sport and hunting arms; artillery ammunition; grenades"⁸

The turnaround in government attitudes and policies towards defense production appears to have been at least partially influenced by an important consideration—jobs. For example, according to an issue of the Czech army magazine, the Military Repairs Enterprise No. 25 is important, in part, because "of its contributions to bringing down unemployment, which has affected North Moravia more than other parts of the Czech Republic."⁹ This same article further points out that "[e]very enterprise is finding it difficult to cope with such a complicated situation as the conversion of arms production."

Indeed, various articles and interviews have suggested that the Czech Government is not fully satisfied with the efficacy of defense conversion and may therefore have to rely on exports to maintain traditional Czech defense industries. The Czech Government's commitment to having world-class defense production is demonstrated by a statement from Petr Necas, Chairman of the Defence and Security Committee of the Czech Parliament, in the official International Fair of Defence and Security Technology and Special Information Systems (IDET) program. According to him, 20 percent of the total expenditure on defense, which in 1997 amounted to 1.97% of the gross national product of the Czech Republic, should be considered as the minimum level of investment that must be set aside for essential technical innovation.¹⁰

2. Ammunition and Weapons Industry

As indicated previously, the Czech Republic had substantial exports of its defense products in 1997. In particular, ammunition and weapons accounted for 8 percent of its 1997 exports.¹¹ One can conclude, then, that the Czech Republic already has a domestic

⁷ Ibid.

⁸ "Czech Republic," *European Diversification*.

⁹ "Changes in Novy Jicin," *Army of the Czech Republic*, January 1997, p. 25.

¹⁰ Petr Necas, untitled statement in IDET KATALOG, 6-10 May 1997, p. 4.

¹¹ "Czech Republic: Czech '97 Surplus."

capability to produce ammunition and weapons and that the quality of these products is recognized and valued by its foreign customers.

a. Quality and Safety Practices

The Czech Military Institute of Weapon and Military Technology has wide-ranging responsibilities in the areas of weapons systems, ammunition, explosives, ballistics, optics and optoelectronics, robotics, and training. Broadly speaking, the Military Institute is responsible for quality and safety. More specifically, it is responsible for:

- Testing infantry weapons, aiming devices, and protective gear
- Updating military standards and regulations regarding weapons, ammunition, and reconnaissance systems
- Writing spare parts catalogs and production documentation
- Testing artillery and tactical rockets, to include ammunition
- Gauging the effectiveness of ballistic protection
- Liquidating explosives, ammunition, and rockets in an environmentally safe manner; developing trainers for weapons crews
- Studying closed circuit TV and optoelectronic imaging
- Investigating accidents involving weapons and ammunition

To carry out these responsibilities, the Military Institute of Weapons and Military Technology is divided along functional lines into three main areas. The first area consists of the Department of Research and Testing, which is further broken down into three sections and one workshop: (1) weapons systems section; (2) ammunition systems section; (3) robotics section; and (4) a production workshop. The second main area is the Technical and Economy Department, which has three sections: (1) economy, (2) business, and (3) administration. The final administrative area consists of two laboratories, one devoted to testing of small arms and protective devices and the other to testing heavy caliber weapons.

This Military Institute claims a number of accomplishments, including the development and production of the following:

- The SNEZKA observation and reconnaissance system

- Day/night aiming and military TV cameras
- Operational diagnostic devices for T-72 tanks and armored fighting vehicles;
- Reactive armor systems for T-55 and T-72 tanks
- Turret systems for T-72 tanks and armored fighting vehicles
- Imitators for air targets
- Technology for the environmentally safe liquidation of more than 50 types of Czech ammunition and rockets

b. Industry Summaries

Following are brief summaries of Czech defense industry activity in the area of ammunition and weapons production.

Sellier and Bellot is one example of the Czech Republic's defense sector manufacturers. It is the leading and largest producer of small caliber ammunition and weapons in the Czech Republic. This manufacturer was one of the first within the Czech defense industry to embark upon privatization.¹² As of 1997, its transformation appeared successful, as it posted a 25 percent increase in sales and saw 36 percent of its production exported to countries including the U.S. and Germany.¹³

Zbrojovka Vsetin-INDET, in cooperation with France's Giat Industries, has developed a 20mm cannon and ammunition, which it plans to manufacture.¹⁴ Production is slated to begin in 1999 on this double-barreled cannon that will fire 2,800 rounds per minute, compared with the 1,800-rounds-per-minute capability of similar systems that are presently available. The Czech Republic's military has already indicated that it intends to use this new cannon and ammunition in conjunction with its L-159 combat aircraft. There is also some preliminary encouragement that this product might be used by some NATO members' militaries. Giat Industries has agreed to assist in introducing this cannon and ammunition to other markets.

Military Repairs Enterprise No. 25, located in Novy Jicin, is an important player in Czech plans for modernizing ground forces equipment. Enterprise No. 25 has operated

¹² Kiss, p. 25.

¹³ "Industry faces testing time of opportunity," *Jane's Defense Weekly*, Country Briefing – The Czech Republic, 20 May 1998, p. 27.

¹⁴ "Czech Republic: Arms Factory Presents Prototype of New Aircraft Cannon," *Daily Report*, FBIS-EEU-98-054, 23 February 1998.

for 50 years as a state-owned facility with responsibility for (1) maintaining and repairing of armored vehicles, (2) providing engineering and technical assistance about their operations, (3) upgrading and modernizing armored equipment, and (4) providing training and expert advice to officers and university engineering students. Even though still concentrating its activity on armored vehicles, this state company has branched out into such related civilian areas as modified T-55 tanks as undercarriages for firefighting vehicles, specialized vehicles for dealing with ecological disasters, and road tractors and snowplows for cleaning streets.

One of the enterprise's principal current activities is a program to modernize the Czech T-72 tanks already in service. The enterprise director estimates that, overall, 355 tanks will be modernized over the course of the upgrade program in batches of 40 to 50 tanks per year.¹⁵ The company hopes to expand this modernization program to foreign T-72s as well.

Enterprise No. 25's T-72 modernization program relies on both domestic and foreign technical support, especially in the area of optoelectronic equipment. Although the Czechs plan to purchase such equipment abroad, it will be tested and fitted to the tanks in the Czech Republic.

Synthesia A.S. Explosive Division (Plant) No. 5 is a large Czech chemical company with a division devoted specifically to producing smokeless powders for small arms, smokeless powders for artillery, industrial explosives, nitrocellulose, aromatic nitrocompounds, black powder, tank ammunition, and combustible 125mm tank ammunition. Its advertisement in *IDET NEWS* also says that it is working on caseless, modular artillery ammunition for 155mm howitzers. This advertisement also claims that "the qualification test for the caseless 155mm artillery ammunition has been already finalized" for the Czech Army.

3. Ammunition and Weapons Manufacturers

Table A-1 in Appendix A itemizes ammunition and weapons being manufactured by specific Czech Republic defense manufacturers. In addition to listing specific products and their manufacturers, wherever applicable, the table indicates whether the ammunition and weapons possess quality certification/registration, warranty information, and documented safety standards and/or are already NATO compatible according to the

¹⁵ Ibid., p. 25.

manufacturer. Table 3-2 lists the Czech Republic's defense manufacturers that are known to be involved in the production of ammunition and weapons. The information provided includes the company name, location and contact information, and a brief description of the product line.

Table 3-2. Czech Ammunition and Related Defense Manufacturers

Plant and Address	Product-line
ADAMOVSKE STROJIRNY A.S. Mirova 2, 679 04 Adamov Tel: 0506/9531 Fax: 0506/951350	Produces the RPTZ-96 handheld anti-tank weapon
ASCENT – LIBOR HROZA 407 11 Decin 33, Kosteini 39 Tel: 0412/547791 Fax: 0412/548416	Manufactures textile cases for arms and related accessories
BEATRONIC Supply, s.r.o. 612 54 Brno, Sumavská 31 Tel: 05/41235517 Fax: 05/41235192 Email: beatsupp@iqnet.cz	Supplies electronic equipment and test apparatus
BOHEMIA T.T.W. a.s. 742 91 Velke Albrechtice Tel: 0655/2361-3 Fax: 0655/2480 Email: bohemttw@applet.cz	Develops, manufactures, services, and reconstructs vehicles to include special wheeled systems, ground force equipment, and air force operational technology
CALIBER Ltd 120 00 Praha 2, Rejskova 7 Exporter for the Czech Arms Industry Tel: 00420/2/6910318 Fax: 00420/2/6911670	Export agent for Czech defense industry
COLORLAK, a.s. 686 02 Stare Mesto, Tovarni 1076 Tel: 0632/527111 Fax: 0632/54215	Produces paints for surface finishing and anti-corrosive protection of military equipment, armament, and other military materiel
CERVA-EXPORT-IMPORT 169 000 Praha 6, Za Strahovem 69 Tel: 02/350089 Fax: 02/350479	Export and import house for the Czech Ministry of Defence

Table 3-2. Czech Ammunition and Related Defense Manufacturers (continued)

Plant and Address	Product-line
CZ STRAKONICE, a.s. 386 15 Strakonice, Tovarni 202 Tel: 0342/5411111 Fax: 0342/322166 Telex: 123644	Manufactures sports and hunting guns
E-COM s.r.o. 684 01 Slavkov u Brna, Celakovskeho 689, POB 11 Tel: 05/44227201 Fax: 05/44227201 Email: e-com@viper.anl.cz	Produces trainers for crew and individual training in shooting, driving, and tactical operations of tanks and armored vehicles
HOLBA A SPOL, a.s. 755 37 Vsetin, Jasenice 778 Tel: 0657/605535 Fax: 0656/611963	Sole reseller for the Czech and Slovak Republics for cleaning, greasing, and conservation oils BREAK-FREE CLP, GMX, and SMX, BOR-CAP cleaning systems for both large and small caliber guns
HQH SYSTEM s.r.o. 130 00 Praha 3, Konevova 188 Tel: 02/67314832 Fax: 02/68448781	Offers a complete range of special products targeted mainly at police and military specialists in pyrotechnics and also a complete line of equipment for anti-terrorist units
MILITARY TECHNICAL INSTITUTE OF THE GROUND FORCES/STATE TESTING LABORATORY No. 240 682 03 Vyskov, VTUPV Tel: ++420/507/303100 420/507/303331 Fax: ++420/303105 ++420/303333	Element of the Czech Ministry of Defence responsible for research, measurement, testing, and job production of the tracked, wheeled, and special vehicles, engineering and road construction equipment
M.P.I. TRADING s.r.o. 150 95 Praha 5, Holeckova 31 Tel: 02/536306 Fax: 02/548185	Agents for Israel Military Industries, Olin Ordnance/Winchester, Hemes a.s.
POLICKE STROJIRNY a.s. 572 12 Policksa Tel: 0463/422111 Fax: 0463/22241	Manufactures ammunition for engineers and artillery, airborne bombs, non-guided rockets. Develops, manufactures, and processes explosives and industrial charges
PREVOVSKE STROJIRNY a.s. 750 53 Přerov, Kojetinska 71 Tel: 0641/231111 Fax: 0641/204952	Research, development, and production of military technology and multi-purpose wheeled armored vehicles

Table 3-2. Czech Ammunition and Related Defense Manufacturers (continued)

Plant and Address	Product-line
PSP BOHEMIA a.s. 180 00 Praha 8, Molakova 576/11 Tel: 02/827295 Fax: 02/827305	International trading company for military technology, integration of modernization programs for medium-size armored vehicles, tanks, and commercial advisory services
MOEX-VLARSKE STROJIRNY SLAVICIN 763 21 Slavice Tel: 042-636701 Fax: 042-63671566 Telex: 067 287	Produces rounds for the SPG-9 recoilless rifle, 30mm ammunition, artillery/mortar fuses, handheld anti-tank weapons, and aircraft delivered bombs
SELLIER & BELLOT TRADE a.s. 258 13 Vlasim Tel: 420-303-591111 Fax: 420-303-43283	The largest producer of a wide range of military and civilian pistol/rifle ammunition rounds and parts in the Czech Republic
SYNTHEZIA a.s. ZAVOD 05 EXPLOZIA 532 17 Pardubice-Semtin Tel: 040/6825500 Fax: 040/6822940	Produces general-purpose industrial and military explosives, including combustible case 125mm tank ammunition Currently developing combustible case ammunition for 155mm howitzers Makes black powders for civilian sporting guns and for military small arms, artillery ammunition, and tactical rockets Produces a wide range of nitrocellulose, nitrochips, and some nitocompounds
UEI-PRUMYSLOVA A LABORATORNI ELEKTRONIKA 142 00 Praha 4, Novodvorska 1010/14 Tel: 02/61351801 Fax: 02/61341807	Imports and sells industrial and laboratory electronic equipment, piezoelectric sensors, and devices for non-destructive testing of materials.

Table 3-2. Czech Ammunition and Related Defense Manufacturers (continued)

Plant and Address	Product-line
<p>VOJENSKY TECHNICKY USTAV LETECTVA A PVO Air Force and Air Defence Technical Institute 197 06 Praha 6 – Kbely, Mladobolesavska</p> <p>Tel: 02/824771 Fax: 02/824771</p>	<p>Develops automatic command and control systems, unmanned air vehicles and reconnaissance devices, flight schedule systems for air traffic control, and remote control devices</p> <p>Conducts operations research into new diagnostic methods, military operational flight tests, aircraft accidents, air force armaments, avionics and weapon systems, and airport light systems</p> <p>Tests and evaluates military aircraft and helicopters, pilot training devices, precision approach radars, parachutes and ejection seats</p> <p>Upgrades and westernizes military aircraft, military helicopters, and individual aircraft systems</p>
<p>VOJENSKY TECHNICKY USTAV (Military Technical Institute) OCHRANY BRNO 602 00 Brno, Rybkova 2a, POB 547</p> <p>Tel: 05/41183105 Fax: 05/41219821</p>	Material engineering, military chemistry, radioelectronic devices and systems
<p>VOJENSKY TECHNICKY USTAV POZEMNIHO VOJSKA (Military Technical Institute of the Ground Forces) 682 03 Vyskov 3</p> <p>Tel: 0507/303101/303317 Fax: 0507/303105/303333 Email: vtupv@dati.cz</p>	Research, development, and testing of automotive and special equipment, applied electronics, detection and sensor electronics, electromagnetic computability, tribology and material protection
<p>VOJENSKY TECHNICKY USTAV VYZBROJE A MUNICE (Military Technical Institute for Weapon and [Ammunition] Military Technology) 763 21 Slavice, Dlouha 300</p> <p>Tel: 0636/71253-55 Fax: 0636/71252</p>	Testing and evaluation of weapons systems, ammunition, explosives, internal and external ballistics, optics and optoelectronics, robotics, training
<p>VOP (Military Repairs Enterprise) No. 12 (741 11 Novy Jicin, Bludovice)</p>	

Table 3-2. Czech Ammunition and Related Defense Manufacturers (concluded)

Plant and Address	Product-line
VOP (Military Repairs Enterprise) No. 25 NOVY JICIN, s.p. 742 42 Senov u Noveho Jicina, Dukelska 102 Tel: 0656/701740. Fax: 0656/701748 Telex: 052196 Email: henry@vtx.cz	Repairs, maintains, and modernizes tanks, special vehicles, fire-fighting equipment, chemical decontamination vehicles, and mobile workshops
VOP (Military Repairs Enterprise) No. 26 785 04 Sternberk, Olomouchka 175	
ZBROJOVKA BRNO, a.s. 656 17 Brno, Lazaretni 7 Tel: 05/45151111 Fax: 05/577549	Manufactures small caliber guns
ZBROJOVKA CESKA 688 27 Uhersky Brod, Svatopulka Cecha 1283 Tel: +420/633655200 Fax: +420 633633665	Produces infantry, hunting, and sporting small arms
ZEVETA GROUP, a.s. 687 71 Bojkovice, Tovami 532 Tel: 0633/921500 Fax: 0633/921506.	Produces the RPG-75 handheld anti-tank weapon, several hand grenades, and signal/flare rounds
ZBROJOVKA VSETIN, a.s. 755 37 Vsetin, Jasenice 1254 Tel: 0657/602007 Fax: 0657/612105 Telex: 052456.	Produces machine guns, self-propelled recoilless rifle SPG-9, and mortar ammunition
ZDAS, a.s. 591 71 Zdar nad Sazavou, Strojinska 6 Tel: 0616/646551 Fax: 0616/642802. Telefax: 62134 Email: http://www.zdas.cz	Produces technology and components for manufacturing projectiles, cartridges, and special pressings

D. HUNGARY

1. Defense Industry Overview

Hungary's defense industry peaked in 1987–88 when 3 percent of its total output was represented by the production of defense-related products.¹⁶ The domestic demand for military production was relatively small, so production relied heavily on the ability to export these products. Traditionally during the Cold War, the major customer for these exports was the Soviet Union. Because no predictions existed for an increase in the domestic demand for defense products and there was an absence of state protection for the defense industry, by 1994 Hungarian defense manufacturers were focusing on altering their production and developing products for the civilian market.¹⁷

2. Ammunition and Weapons Industry

Hungary has been known for its focus and expertise in electronics within the defense industry.¹⁸ Therefore, it would appear that Hungary's capabilities and capacities to produce ammunition and weapons are perhaps less developed than those in the Czech Republic and Poland. Still, the Hungarian defense industry has been responsible for meeting 25 percent of the Hungarian Armed Forces' needs, predominantly for small arms, electronic parts, ammunition, and clothing.¹⁹

3. Ammunition and Weapons Manufacturers

Table A-2 in Appendix A itemizes the ammunition and weapons being manufactured by specific Hungarian defense manufacturers. In addition to listing specific products and their manufacturers, wherever applicable, the table indicates whether the ammunition and weapons possess quality certification/registration, warranty information, and documented safety standards and/or are already NATO compatible according to the manufacturer. Table 3-3 is a list of Hungary's defense manufacturers that are known to be involved in the production of ammunition and weapons. The information provided includes the company name, location and contact information, and a brief description of the product line.

¹⁶ Kiss, *Defence Industry in East-Central Europe*, p. 80.

¹⁷ Ibid., p. 88–95.

¹⁸ Ibid., p. 77.

¹⁹ "Hungary," *European Diversification*.

Table 3-3. Hungary Ammunition and Related Defense Manufacturers

Plant and Address	Product-line
Technika Foreign Trading Company Salgotrjani UT 20 H-1475 Budapest Hungary POB 125 Tel: 36-1/114-3230 or 114-1290 Telefax: 36-1/113-4686 Telex: 225765 tkvbp h	Foreign trading company that sells arms and ammunition
INDEX Foreign Trading, Contracting and Engineering Co. Ltd. Fo u. 14-18 H-1011 Budapest Hungary Tel: (36-1) 115-9290	Foreign trade company that manages all arms exports from Hungary
Diosgyor Arsenal	Produces gun barrels, including those for the 57mm AA guns and 122mm artillery, although much of this effort was suspended in the 1990s License-manufactured the 2S1 122mm self-propelled artillery howitzer and the related MT-Lbu armored command vehicle Developing a self-propelled version of the Vasilek mortar on the MT-Lbu chassis
Mechanikai Muvek P.O. Box 64 H-1518 Budapest Hungary	Produces mortar ammunition
Danuvia Arsenal	Small arms production
Lampagyár Arsenal	Small arms production
Matravidéki Femmuvek H-3332 Sirok Hungary Tel: (36-90) 366-2122 Fax: (36-90) 366-1004	Produces pistol and rifle ammunition
Fegyver es Gazkeszuelekgyara NV (FEG) Arms and Gas Appliances Factory Soroksari ut 120 H-1095 Budapest Hungary Tel: (36-1) 477-920	A state-owned arsenal, produces the whole family of AK assault rifles, various pistols and submachine guns

E. POLAND

1. Defense Industry Overview

Poland has long had a large and capable defense industry. With respect to sheer production capacity, Poland has produced more tanks than France and Britain since the 1950s. Poland was the third largest defense producer in the Warsaw Treaty Organization (WTO), a role that only increased in importance in the region upon the breakup of Czechoslovakia. In addition, Poland provided a significant amount of defense products to developing countries and other approved international customers in arrangements primarily directed by the Soviet Union. In the period from 1981 to 1991, Poland exported \$12.5 billion in arms. Since the 1990s, however, Poland's exports have declined somewhat as indicated in Table 3-4. Other trends witnessed in the Polish economy and, more specifically, the defense industry are illustrated in Table 3-5.

Table 3-4. Trends in Polish Imports and Exports
(\$ millions, then-year \$)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Arms Imports	625	250	--	--	5	5	90	na	na	na
Arms Exports	400	230	110	20	10	50	40	na	na	na

Table 3-5. Key Indicator Trends for Polish Defense Industry

Number of Enterprises	128 in 1991, but only 31 in 1997
Size of Arms Output	55 percent of 1991 figure
Defense Industry Employment	100,000 in 1991, but only 74,000 in 1997

Compiled from "Poland: Defence Industries in East Europe," *Daily Report*, FBIS-EEU-98-082, 1 March 1998.

In addition to having relied upon the Soviet Union and its approved customer list for exports, Poland has a tradition of following the Soviet Union's lead in R&D. Indeed, Polish defense industrial RDT&E is somewhat limited because most weapons produced in Poland until recently were based on license-manufactured Soviet systems and often contained a significant fraction of Soviet components. One of the few areas in which domestic RDT&E has existed is helicopters and light aircraft, largely because of the efforts of the PZL aircraft firm. Poland now recognizes the importance of a more broad based domestic RDT&E capability and is striving to develop in this area.

The big issue presently facing the Polish defense industry (and the defense industries in the two other new NATO members) is whether it can survive in the new environment. A solution will have to be found to deal with the reduction of domestic military orders, the drying up of certain export markets, and increased competitiveness in others. Judging from past experience, Poland will remain dependent on important sectors of its domestic defense industry. For example in the ordnance field, the focus will likely be fire control systems and some other advanced components. Poland is turning to Western firms for assistance in these areas, though it would not be surprising to see some continued level of cooperation with Russia. Although a certain level of cooperative effort with the West may be desirable, the history of the Polish defense industry suggests that outright purchase of Western equipment will be limited in favor of local licensed production or deals predicated on heavy offset arrangements. Therefore, Poland is likely to maintain a major arms industry much as it did in the 1920s and 1930s, as a hedge against being cut off from arms supplies and as a method of encouraging industries in the less developed regions of the country.

2. Ammunition and Weapons Industry

In the Soviet-sponsored COMECON Military Industrial Commission since 1956, Poland was part of a coordinated defense research and acquisition scheme among the Warsaw Pact countries. The Soviet policy had been to assign a certain degree of specialization for Warsaw Pact members' armament production in order to foster industrial cooperation between Pact members. Consequently, Poland's defense industry possessed great strength in such areas as tanks, helicopters, and amphibious warfare vessels, but was weaker in other areas. Because of these influences, it is unclear how Poland's ammunition and weapons industry may have been affected.

The domestic arms industry is capable of accounting for 70 percent of the Polish military's needs, but there has been some concern over its ability to put advanced solutions into practice.²⁰ Therefore, Poland has also remained open to acquiring ammunition and weapons from foreign sources. For example, Poland would like to acquire a new self-propelled gun compatible in caliber with NATO's 155mm. Two programs have been seriously examined: (1) South Africa's effort to mount their G-6 turret on Polish produced T-72 tank hulls called the T-6, and (2) the British AS-90 in a

²⁰ "Poland: Arms Industry Said 'Paralyzed,'" *Daily Report*, FBIS-EEU-98-117, 27 April 1998.

version manufactured in Poland. In 1998, Polish officials acknowledged that they would prefer to acquire the AS-90, but that funding has yet to be approved.

a. Quality and Safety Practices

Poland does have a procedure for addressing the quality and safety of ammunition and weapons.²¹ The Institute of Weapon's Systems Technology (ITU) is a Polish research center that focuses on ammunition and weapons, including testing for acceptance, quality control, and safety. It even uses an "ammunition-managing system" to evaluate ammunition, record data, and make recommendations on the ammunition's use. In general, ITU has worked with the Polish defense industry to ensure that the models and prototyping used are based on up-to-date technology. Because of recent shifts in the doctrine and needs defined by the Polish industry, ITU has been concentrating its efforts on artillery and mortars, as well as on anti-tank and housing ammunition. Furthermore, in response to Poland's anticipated NATO membership, ITU has sought to adopt Western testing techniques and standards and achieve the accreditation of its laboratory facilities by the Polish Center for Testing and Certification, as well as other certification bodies.

b. Standardization Efforts

Poland's decision to join NATO and subsequent efforts to affiliate with the European Union (EU) are driving the Polish defense industry and decision makers toward implementing common and acceptable European/NATO standards. Both of these decisions are greatly affecting the way the Polish defense industry will produce defense goods in the coming decades. This switch to new NATO and EU standards is prevalent in the Polish munitions manufacturing sector. This sector has made the most headway in planning and implementing the necessary changes to conform to NATO and EU codes and standards. As a complement to these efforts, the Polish Ministry of Defence touches on related issues through its participation in the following cooperative organizations:

- Conference of National Armaments Directors (CNAD)
- NATO Industrial Advisory Group (NIAG)
- Western European Armaments Group (WEAG)
- Western European Armaments Organization (WEAO)

²¹ "Poland: Military Research Institute Profiled," *Daily Report*, FBIS-EEU-96-137, 16 July 1996.

- German-French Armament Organization (OCCAR)
- Joint Armaments Co-operation Structure (JACS)²²

During the recent MSPO'98 defense exhibition in Kiele, Poland, IDA had the opportunity to interview a number of senior defense industry representatives about their progress toward adopting NATO and EU standards. They made several points about their efforts to date. The first is that Polish defense industries are still state run²³ and the pace of change is dictated by the state and not by boards of directors or factory managers. This has positive and negative effects on the process. On the positive side, any changes instituted will be uniformly applied to all Polish defense industries. However, all governments are traditionally slow to implement change. The pace of change is illustrated by one factory manager's estimate that if current planning keeps pace, most of the factories involved in the manufacturing of ammunition will be adhering to NATO standards by the year 2000 and possibly as late as 2002.

Another observation made by Polish factory representatives was the slow pace at which the Polish Government was implementing NATO standards and disseminating information to the defense industry. Many factory representatives were aware that several NATO committees and representatives had been meeting in Poland during 1997 and 1998, but they remain generally unaware of the specific outcomes of those discussions. One ammunition factory manager noted that much of the information on NATO ammunition standards was obtained from contacts in the West rather than from information disseminated by the Polish Ministry of Defence (MoD). In addition to informal contacts, several Western ammunition manufacturers, specifically from Germany and the United States, have shown interest in establishing joint ventures involving NATO ammunition production. These efforts would greatly speed the flow of information and access to Western technologies and techniques used in the manufacturing of ammunition. Many such joint venture offers are being considered by the Polish MoD; however, little movement along those lines appears to have taken place to date, largely owing to a shortage of funds.

Finally, Polish factory representatives were interested in receiving any kind of assistance possible on how to convert their factories from Eastern to Western

²² "Poland Prepares for Modernization," *Defence Procurement Analysis*, Spring 1998, p. 114.

²³ Recently the Polish Cabinet decided to embark on the privatization of several of Poland's key defense industries. Pete O'Neill, "Poland to Privatize Key Defense Industries," *Jane's Defense Weekly*, 28 April 1999, p. 20.

manufacturing standards. This goal is being addressed by efforts across the Polish manufacturing sector to adopt the International Organization for Standardization's (ISO) established ISO 9000 series of standards. ISO 9000 represents a system of procedural guidelines to be implemented and monitored by companies to ensure quality and consistency of their products and services. Because Poland is interested in affiliating with the European Union, a real push is underway to get Polish companies registered/certified as ISO 9000 compliant. This effort will greatly enhance Poland's chances of gaining either membership in or affiliation with the EU. Moreover, the Polish defense industry in general and the ammunition industry specifically have their own incentives for working toward ISO 9000 compliance. Aside from achieving NATO compatibility of Poland's own defense assets, Polish ammunition manufacturers want to sell both military and civilian ammunition to Europe and the United States. ISO compliance will be prerequisite to achieving this goal.

c. Industry Summaries

Following are some brief summaries of activities underway by the Polish defense industry in the area of ammunition and weapons production.

Huta Stalowa Wola. A joint program has existed with GM Delco to market a 25mm cannon for a turret upgrade. This approach would replace an older 73mm low-pressure gun about which NATO safety experts have expressed reservations. In addition, this decision to pursue the Delco turret would seem closely tied to Poland's NATO membership and desire to ensure compatibility with NATO ammunition.

In addition, it is expected that Huta Stalowa Wola will be responsible for the actual manufacturing of one of Poland's key modernization projects, which is to provide the army "with a modern self-propelled howitzer fitted with a NATO standard 155mm ordnance."²⁴ Presently the design competition for this project is between the German PzH-2000, Slovakian ZUZANA, and British AS90. This project has been funded through the initial phase of prototyping, which is scheduled to begin in 1999, and the end product is anticipated to cost roughly \$2.8 million.²⁵

²⁴ "We Have to Start Modernizing Our Armed Forces At Last," *Military Technology - MILTECH*, September 1998.

²⁵ *Ibid.*

Huta Stalowa Wola also has a gun barrel facility where it manufactures 100mm and 125mm tank guns, as well as 122mm 2A31 howitzer tubes.

BELMA. The Bydgoszcz Electromechanical Plant produces anti-tank and anti-personnel mines as well as grenade and other types of fuses.

Zaklady Metalowe Mesko. The Mesko Metal Plant in Skarzysko-Kamienna is Poland's largest ordnance manufacturer. It produces a full range of Soviet-pattern small arms ammunition, 14.5mm and 23mm auto cannon ammunition, 100mm and 125mm tank ammunition, and 122mm artillery ammunition. It also produces a full range of fuses. Missile production at the plant has included the Malyutka (AT-3 Sagger) and the Strela (SA-7 Grail).

Zaklady Mechanicze Tarnow. The Tarnow Mechanical Plant is Poland's primary manufacturer of auto cannons. It manufactures the ZU-23 towed 23mm anti-aircraft gun under Russian license, as well as several variants. It also manufactures a line of 40mm grenade launchers.

Zaklady Mechanicze Lucznik. This plant in Radom has been manufacturing small arms since the 1930s. It currently produces AK assault rifles and their derivatives, the P-84 Glaubert machine pistol and the Tantal assault rifle. Total Polish small arms production since 1953 has included 30,000 pistols, 1.6 million assault rifles, and 60,000 machine guns.

The Lucznik Mechanical Plant has traditionally produced the 7.62mm Kalashnikov, but during the early 1990s, it planned to follow this up with the Tantal carbine for 5.45mm Soviet-type ammunition. This plan was somewhat ill-timed, however, since both Poland's military and Lucznik's other foreign customers were increasingly interested in only those weapons and ammunition that would be interoperable with the NATO standard 5.56mm. Ultimately, Lucznik designed the Beryl automatic rifle, using virtual computer simulation, as a 5.56mm NATO-compatible caliber. U.S. Marines who have handled these rifles have commented on the rifle's simplicity and light weight. Furthermore, the Beryl is expected to cost roughly \$1,000, a third of what the comparable U.S. M-16 rifle costs. The Polish army has indicated its intent to use the Beryl to replace the Soviet designed AK (Kalashnikov) rifles. Because of funding constraints, the Polish army will acquire these new weapons over the next several years, with weapons being prioritized for those units first scheduled to adjust to NATO standards or participate in NATO operations. Unfortunately, the Polish military's

orders have yet to approach the Lucznik plant's production capacity of 3,000 to 3,500 per month. Moreover, foreign markets appear to be currently dominated by competitors. Consequently, Lucznik is operating at less than full production on the Beryl, while also maintaining its separate production line for the Soviet standard 7.62mm.²⁶

Zaklady Tworzyw Sztucznych PRONIT. The Pronit plant in Pionek manufactures explosives and munitions including artillery ammunition and signal flares.

3. Ammunition and Weapons Manufacturers

Table A-3 in Appendix A itemizes the ammunition and weapons being manufactured by specific Polish defense manufacturers. In addition to listing specific products and their manufacturers, wherever applicable, the table indicates whether the ammunition and weapons possess quality certification/registration, warranty information, and documented safety standards and/or are already NATO compatible. Table 3-6 is a list of Poland's defense manufacturers that are known to be involved in the production of ammunition and weapons. The information provided includes the company name, location and contact information, and a brief description of the product line.

Table 3-6. Poland Ammunition and Related Defense Manufacturers

Company Information	Product Line
Zaklady Metalowe Lucznik Ul. 1905 Roku 1/9 26-600 Radom, Poland Telephone: 0-48-48-291-41 Telefax: 0-48-48-233-60 Telex: 0672235 zam	Pistols and submachine guns
Zaklady Metalowe Tarnow Kochanowskiego 30 33-100 Tarnow, Poland Telephone: 0-48-14-21-60-01 Telefax: 0-48-14-21-64-96 Telex: 066351	23mm AAA guns, 12.7mm machine guns, and 40mm grenade launchers

²⁶ "Poland: New Domestically Designed Rifle for Army Presented," *Daily Report*, FBIS-EEU-98-071, 12 March 1998, and "Poland: Small Arms Maker's Production, Financial Troubles Viewed," *Daily Report*, FBIS-EEU-98-188, 7 July 1998.

Table 3-6. Poland Ammunition and Related Defense Manufacturers (continued)

Company Information	Product Line
Zaklady Przemyslu Metalowego H. Cegielski Ul. 28 Czerwca 1956 r. 223/229 60-965 Pozanan, Poland Telephone: 0-48-61-31-14-52 0-48-61-31-10-02 Telefax: 0-48-61-31-28-10 Telex: 0413451 pl	7.62mm Machine Guns
Widzewskie Zaklady Maszyn Wlokienniczych Ul. Niciarniana 41 92-318 Lodz, Poland Telephone: 0-48-42-74-99-88 Telefax: 0-48-42-74-90-68 Telex: 884118	Law enforcement special pistols
Huta Stalowa Wola Exporter Commercial Office-Warsaw Ul. Kolejowa 57 Warszawa, Poland Skr. Poczt. P.O. 150 Telephone: 0-48-22-327-976 0-48-22-325-542 Telefax: 0-48-22-327-051 0-48-22-321-480 Telex: 813813 hswbh pl	Production of mortar/artillery systems and guns and IFVs
Zaklady Mechaniczne Bumar-Labedy Mechanikow 9 44-109 Gliwice, Poland Telephone: 0-48-31-34-51-11 Telefax: 0-48-31-34-24-43 0-48-31-34-69-66 Telex: 036208 ZAML PL 036209 ZAML PL 036237 ZAML PL	Production and modernization of MBTs, IFVs, ARVs, and AV-LB
Zaklady Metalowe Mesko Im. Gen. Wladyslawa Sikorskiego Ul. Legionow 122 Skarzysko-Kamienna, Poland Telephone: 0-48-47-53-30-09 0-48-47-53-33-62 0-48-47-53-33-07 Telefax: 0-48-47-53-03-44 Telex: 612551	Small caliber ammunition, artillery ammunition, and rocket assemblies

Table 3-6. Poland Ammunition and Related Defense Manufacturers (continued)

Company Information	Product Line
<p>Cenzin Foreign Trade Enterprise Foreign Trade Enterprize Ul. Frascati 2 00-489 Warszawa, Poland</p> <p>Telephone: 0-48-22-629-63-96 Telefax: 0-48-22-628-63-56 Telex: 814505 czi pl</p>	Official state trading company of Poland
<p>Zaklady Tworzyw Sztucznych Pronit Ul. Zakladowa 7 26-940 Pionki, Poland</p> <p>Telephone: 0-48-48-12-47-23 Telefax: 0-48-48-12-55-34 Telex: 0672232</p>	Black propellants for small arms/artillery, 125mm tank ammunition, artillery charges, signal ammunition, and mine detonating cord
<p>Zaklady Sprzety Precyzyjnego Niewiadow Ujazd 97-170 Niewiadow, Poland</p> <p>Telephone: 0-48-45-50-71 Telex: 884416</p>	Light and heavy anti-tank mortar ammunition, 73mm gun ammunition, hand-held disposable anti-tank missiles, non-guided missiles, and anti-tank mines
<p>Zaklady Elektromechaniczne Belma Ul. Lochowska 69 85-395 Bydgoszcz, Poland</p> <p>Telephone: 0-48-52-39-22-40 Telefax: 0-48-52-331-30 Telex: 0562621</p>	Weapon fuses
<p>Zaklady Metalowe Dezamet 39-460 Nowa Deba woj. Tarnobrzeg, Poland</p> <p>Telephone: 0-48-15-46-26-01 0-48-15-46-26-11 Telefax: 0-48-15-46-26-10 Telex: 062307 ZDM 062455 ZDM</p>	Cluster bombs, artillery ammunition, fuses for artillery/rocket ammunition, hand grenades, and rifle grenades
<p>Osrodek Badawczo-Rozwojowy Skarzysko Ul. Legionnow 122 26-110 Skarzysko-Kamienna, Poland</p> <p>Telephone: 0-48-47-53-68-00 0-48-47-53-68-02 0-48-47-53-68-05 0-48-47-53-68-36 0-48-47-53-68-40 Telefax: 0-48-47-53-68-03 0-48-47-58-68-36 Telex: 0613588 SKOBR PL</p>	81mm and 122mm ship-launched decoys

Table 3-6. Poland Ammunition and Related Defense Manufacturers (concluded)

Company Information	Product Line
Tlocznia Metali Pressa Spolka Akcyjna Ul. Obornicka 1 Bolechowo k/Poznania 62-005 Owinska, Poland Telephone: 0-48-61-12-30-11 Telefax: 0-48-61-12-31-92	122mm MLRS rocket ammunition for the BM-21 GRAD
Zaklady Tworzyw Sztucznych Erg Bierun Chemikow 133 43-150 Bierun, Poland Telephone: 0-48-03-116-09-00 Telefax: 0-48-03-116-03-57 Telex: 0312204	Igniting caps for projectiles, electric detonators, percussion caps, electric blackpowder igniters, and electric pyrotechnical igniters
Zaklady Chemiczne Nitro-Chem Ul. Wojska Polskiego 65A 85-825 Bydgoszcz, Poland Telephone: 0-48-52-61-78-46 Telefax: 0-48-52-61-11-24	Artillery shell explosives and production of various military explosives

4. RESOURCES AND OPTIONS

The first part of this chapter covers the NATO processes and organizations with which the Czech Republic, Hungary, and Poland have been or will be involved in order to accomplish the objective of full NATO compatibility of their ammunition and weapons. The various U.S. defense organizations, particularly in the Army, that provide options for these three countries in achieving this objective are described in the remainder of the chapter.

A. RELEVANT NATO ORGANIZATIONS

As new members of NATO, the Czech Republic, Hungary, and Poland have the opportunity to participate fully in NATO's various organizations, working groups, and resources devoted to issues of quality and safety and of ammunition and weapons. Descriptions of several of NATO's efforts in these areas follow. These descriptions were derived from the NATO Web site, the NATO Handbook, and conversations with personnel in the Office of the Secretary of Defense (OSD) and the U.S. Army.

1. Division of Defense Support

The Division of Defense Support advises NATO and related bodies "on all matters relating to armaments research, development, production, procurement, and materiel aspects of air defense and command, control and communications systems."¹ Within this Division is the Directorate of Armaments Planning, Programmes and Research, which is responsible for the formulation of policy initiatives in the armaments field. These initiatives are designed to help direct the Conference of National Armaments Directors (CNAD) activities towards the accomplishment of new missions, such as consultations among member nations on the defense equipment implications of peacekeeping operations. This directorate provides support to the Army, Navy, and Air Force Armaments Groups.

¹ NATO Handbook: The Division of Defence Support, <http://www.nato.int/docu/handbook/hb30700e.htm>

2. Conference of National Armaments Directors (CNAD)

The CNAD is the principal forum in NATO for armaments cooperation. Its focus is materiel. The CNAD "meets on a regular basis to consider political, economic, and technical aspects of the development and procurement of equipment for NATO forces." Since 1993, the CNAD has focused on three priorities.²

- Harmonizing military requirements on an Alliance-wide basis
- Promoting essential battlefield interoperability
- Pursuing cooperative opportunities

Groups under the Conference are active in such fields as defense procurement policy and acquisition practices, codification, quality assurance, test and safety criteria, and materiel standardization. The three new NATO members have been involved in CNAD activities.

The Conventional Armaments Planning System (CAPS) provides guidance to the CNAD and information to the member nations on armaments programs to meet NATO military requirements and opportunities for armaments cooperation. The NATO Conventional Armaments Review Committee (NCARC) under CNAD authority releases recommendations every 2 years.³

The NATO Industrial Advisory Group (NIAG) is a high-level advisory group of senior personnel from NATO member companies. The NIAG provides assistance on industrial matters, enabling the CNAD to benefit from industry's advice on how to foster government-to-industry and industry-to-industry cooperation and assisting the Conference in exploring opportunities for international collaboration.

Under the CNAD are the NATO Armaments Groups and several Cadre Groups, such as AC/301, Standardization; AC/250, Quality Assurance; AC/135, Codification; and the AC/310 Cadre Group for Safety and Suitability for Service of Munitions and Explosives.

² NATO Handbook: Armaments Cooperation, <http://www.nato.int/docu/handbook/hb21300e.htm>

³ NATO Handbook: Armaments Planning, <http://www.nato.int/docu/handbook/hb21400e.htm>

a. The Group of National Directors for Quality Assurance CNAD Partnership Group (AC/250/CPG)

It is important that all ammunition and weapons used in NATO operations meet certain quality standards. AC/250 is the group that defines NATO policy and develops standards for an integrated approach to quality, reliability, and maintainability. Its mission is to provide counsel to the CNAD and leadership to NATO member nations, agencies, and commands in their implementation and advancement of quality principles and practices. Established in 1964 as a subordinate of the CNAD, this group developed and is responsible for STANAG 4107 and the AQAPs as described in Section 4.B. The Group was opened to PIP Partners in 1996 as a CNAD Partnership Group. Upon becoming NATO members, the Czech Republic, Hungary, and Poland became participants of the AC/250 main group.

b. The Group of National Directors on Codification (AC/135)

For the three new member countries' ammunition and weapons to be confidently used as NATO interoperable and interchangeable items, a process of codification is required. The formally documented process can be quite time-consuming. In fact, it took some NATO-16 members many years to establish the formal NATO codification of their ammunition and weapons. AC/135 runs the NATO Codification System (NCS), which has been developed to meet NATO's interoperability and interchangeability needs, but is in itself a more general inventory management system with regard to the acquisition of materiel, the management of resources, maintenance, and disposal. This is evidenced by the fact that over 30 non-NATO countries have partially or completely adopted the NCS.

Codification is classified into four main areas of logistics operations:

- Acquisition of material—initial purchase and reprovisioning
- Management of resources—warehousing, distribution, and redistribution of material
- Maintenance—repair or overhaul
- Disposal

c. Safety and Suitability for Service of Munitions and Explosives Cadre Group (AC/310)

AC/310 determines how to test munitions and explosives and the requirements to be met. It also is involved in the quality assurance arena. The NATO Insensitive Munitions Information Center (NIMIC) is an outgrowth of AC/310.

The NATO Insensitive Munitions Information Center (NIMIC) is a technical analysis center that helps member nations increase the safety, or reduce the vulnerability, of their weapons and weapon platforms in combat and peacetime operations. It provides support to members on how to design features into munitions that will improve safety and survivability throughout their life cycle, in variable environmental conditions, and with as little need for human supervision or action. As of 1998, there were 10 participants. Member contributions finance the NIMIC activities and no additional fees are charged for services. Non-members may receive assistance through NIMIC with the permission of the Steering Committee.⁴

3. Military Agency for Standardization (MAS)

MAS is the principal military agency for standardization within NATO. Its focus is operational (i.e., doctrine, tactics, and procedures) along with materiel responsibilities. Cooperation between international technical expert groups and the MAS is effected through the NATO Standardization Group. NATO Standardization Agreements (STANAGs) for procedures and systems and equipment components for armaments are developed and promulgated by the MAS in conjunction with the CNAD.

MAS is organized with service boards and subordinate working groups. NATO's Land Forces Ammunition Interchangeability Working Group (Ammo WG) reports to the Army Board. The Ammo WG also integrates the helicopter ammunition work of the Air Armaments Working Group into Ammo WG activities.

The Ammo WG deals with the interchangeability of ammunition, focusing on everything currently fielded by NATO members and due to be fielded within the next 2 years. The chair of this group is also a representative to the MAS service board. The U.S. provides a Joint Service Delegation to the Ammo WG composed of Army and Marine Corps members. The U.S. Army Tank and Automotive Command (TACOM)

⁴ NATO Insensitive Munitions (IM) Information Center (NIMIC) Homepage, <http://www.nato.int/related/nimic/home.htm>

Armaments Research Development and Engineering Center (ARDEC) provides the Head of the U.S. Delegation, the Custodian Member, and supporting technical staff. Other U.S. supporting staff is drawn as needed from the Army's Aviation and Missile Command (AMCOM), Training and Doctrine Command (TRADOC), and U.S. Army Europe.

The Ammo WG has had two meetings involving the Czech Republic, Hungary, and Poland at which the three new members discussed their national codification and color marking systems. These are instrumental issues in working to achieve interchangeability with their NATO counterparts.

4. Standardization Organization

The relatively new NATO Standardization Organisation (1995) was formed to give renewed impetus to efforts to improve the coordination of allied policies and programs for materiel, technical, and operational standardization. It supports the PfP initiative by addressing specific proposals for improved standardization put forward by Partner countries and promotes closer collaboration with international civilian standards organizations, such as the International Organization for Standardization (ISO).⁵ A *NATO Review* article recently stated:

The achievement of operationally effective levels of standardization (compatibility, interoperability, interchangeability or commonality) in doctrine, tactics, defence materiel and battlefield equipment has been a long standing, but elusive NATO goal.⁶

5. NATO Maintenance and Supply Agency (NAMSA)

NAMSA is NATO's primary logistics support agency providing combat and peacetime services. It supports a variety of common weapon system programs and partnerships. Among its activities are codification and identification services. NAMSA has developed a successful demilitarization program and a complete program in Western defense contracting to train member nations that do not have these types of systems already in place.⁷ NAMSA has been charged by AC/135, Group of National Directors on

⁵ NATO Handbook: Standardization, <http://www.nato.int/docu/handbook/hb21400e.htm>

⁶ Giovanni Battista Ferrari, "NATO's New Standardization Organization Tackles an Erstwhile Elusive Goal," *NATO Review*, Web Edition, Vol. 43, No. 3, May 1995, p. 33-35.

⁷ Ammunition Data Base, <http://www.king.igs.net/ammo/namsa.htm>

Codification, to manage and distribute Allied Codification Publications (ACodPs) and STANAGS and to run the NATO Mailbox System (MBS) for the transfer of data among member countries. NAMSA developed the NATO Ammunition Data Base (NADB) at the request of the Ammunition Interchangeability Working Party.

The NADB is the most complete and authoritative source of technical and logistical information on NATO ammunition interchangeability. The NADB is reviewed, modified, amended, and reissued on CD-ROM every 12 months. Ammunition management is enhanced by the knowledge provided by the NADB in the areas of disposal, storage, shipping, procurement, marketing, engineering, codification, and standardization and interchangeability policy.⁸

B. NATO QUALITY ASSURANCE SYSTEM

The NATO Quality Assurance System includes STANAGs, Allied Quality Assurance Publications (AQAPs), and Allied Reliability and Maintainability Publications (ARMPs).

It is the considered opinion of the group that the full implementation of the STANAGs and Allied Publications will economically benefit industry in both military and civilian sectors. Specifically it can be expected that the application of the principles and practices set forth in these documents will help producers to meet delivery dates, to prevent reruns and plant shutdowns, to reduce scrap and generally to establish reputations for delivering reliable goods and services.⁹

1. STANAG 4107, *Mutual Acceptance of Government Quality Assurance and Usage of the Allied Quality Assurance Publications*

This NATO STANAG establishes a process whereby NATO countries request and accept the quality assurance services of one another's designated quality authorities in order to assure the quality of military materiel and services produced in NATO countries. This agreement details the terms and procedures for cooperation between NATO members to provide for the quality assurance of their defense suppliers.

The framework of STANAG 4107 provides a process through which a purchasing NATO country may request that the assigned authority in a manufacturing NATO

⁸ Ammunition Data Base, <http://www.king.igs.net/ammo/FACTSHT.html>

⁹ From AQAP 100

country perform the required quality assurance services on its behalf. The NATO country in which the supplier resides, therefore, evaluates the contractor's quality assurance procedures to assure the purchasing NATO country that the contractor will produce and deliver quality products and services that comply with contractual requirements. STANAG 4107 is used when the contract places a high priority on the verification of quality and stipulates that it must be done before the products or services are received.

If countries participate, they will provide a Government Quality Assurance (GQA) service when requested by the National Authority in a purchasing country or NATO organization for all defense project orders. "Government Quality Assurance is the process by which the Appropriate National Authorities establish confidence that the contractual requirements relating to quality are met." The "appropriate contractual NATO quality requirements (AQAPs) will be incorporated into contracts where GQA is requested under the terms of this STANAG and its related documents."¹⁰

2. Allied Quality Assurance Publications

Originally the AQAPs were similar to U.S. DoD documents on quality assurance, but as ISO became a more dominant player in international standardization, NATO transitioned the AQAPs to be closer to the ISO 9000 series of standards. They are generally based on the various ISO 9000 quality system standards, but with additional requirements corresponding to NATO quality system needs.¹¹

NATO members develop their own systems for GQA using the following AQAPs:

- AQAP-110, "NATO Quality Assurance Requirements for Design, Development and Production" is similar to ISO 9001:1994
- AQAP-120, "NATO Quality Assurance Requirements for Production" is similar to ISO 9002:1994
- AQAP-130, "NATO Quality Assurance Requirements for Inspection and Test" is similar to ISO 9003:1994

Two types of AQAPs exist—

¹⁰ STANAG 4107

¹¹ Information in this section derives from the *DoD/NATO/ISO Quality System Standards* source on the Web.

- Contractual—set up in technical specification format and intended for contractual use
- Guidance—provide evaluation or procedural guidance in applying contractual AQAPs or the development of a GQA plan

C. NATO CODIFICATION SYSTEM (NCS)

The NCS is based on two main STANAGS—3150, the *Uniform System of Supply Classification*, and 3151, the *Uniform System of Item Identification*, and has been in existence since the mid-1950s.¹² For any one item, there may be numerous manufacturers from different countries, each with their own part numbers. Through the NCS, these are recognized as the same item and assigned a single NATO stock number (NSN). The system has two main rules:

- Each supply item has a unique number
- The National Codification Bureau (NCB) of the producing country codifies its own production items, regardless of which country is the end user

All countries participating in the NCS, whether a NATO or non-NATO sponsored member, maintain their own NCB or central organization to implement the rules of this codification system. The NATO Maintenance and Supply Agency (NAMSA) compiles the NSN information for each NATO country in the NATO Master Cross Reference List (MCRL).¹³

The database allows the designer and project manager to screen for parts which are already stocked in the supply system and which could be used, rather than producing a new item. This practice reduces the variety of items to be managed and eliminates unnecessary costs for experimentation, identification, storage, and other related supply functions. Nearly 50% of the components used in the design of new equipment are already codified.¹⁴

The Warsaw Pact countries had their own codification system. Now, the new member countries must find a translation from the Warsaw Pact codification system to the NCS. This successful translation is particularly important to the new NATO members because participation in the NCS is viewed as a key step toward achieving

¹² Brenda Eddy and Steven Arnett, "The NATO Codification System: A Bridge to Global Logistics Knowledge," *The DISAM Journal*, Fall 1998, p. 1.

¹³ *Ibid.*, 12.

¹⁴ *NATO Codification System* (Web page), <http://www.nato.int/structur/AC/135/NCS/index.htm>

NATO interoperability. Upon attaining membership, the Czech Republic, Hungary, and Poland became full members of the NCS. It is important to note, however, that at least by the fall of 1998, both the Czech Republic and Poland had received sponsorship within the NCS and were developing NCS-compliant defense cataloguing systems, while Hungary was also pursuing the NCS sponsored application process.¹⁵

The U.S. NCB and its related activities are run by the Defense Logistics Information Service (DLIS), which falls under the purview of the Defense Logistics Agency (DLA). "DLIS NCB personnel are available to assist international partners in implementation of the NCS."¹⁶ Indeed, international logistics customers, including the new NATO members, could seek out the services and products provided in this area by DLIS. "DLIS also provides a wide array of formal training courses, which are available to U.S., NATO, and other FMS customers each year. Standard courses ... provide classroom training on elements of the NCS, as well as how to use various DLIS information products."¹⁷

D. AMMUNITION INTERCHANGEABILITY

Ammunition codification relies on two STANAGS and several Allied Ordnance Publications (AOPs). STANAG 2953, *The Identification of Ammunition*, refers to AOP-2B, *The Identification of Ammunition*, for details of color coding and marking. STANAG 2459, *Procedures for Ammunition Interchangeability*, refers to AOP-6, the *Catalogue of Ammunition Held by Nations that Satisfy Interchangeability Criteria*. Also applicable is AOP-19, *Land Forces Explosives and Demolition Accessories Interchangeability Catalogue in Wartime*, which lists demolition items, such as dynamite.

AOP-6, *Catalogue of Ammunition Held by Nations that Satisfy Interchangeability Criteria*, is the catalogue that identifies the ammunition suitable for land forces ammunition interchangeability. TACOM-ARDEC at Picatinney Arsenal maintains AOP-6 out of its International Office and will be incorporating data for the three new

¹⁵ Eddy and Arnett, 9-11.

¹⁶ Ibid., 12.

¹⁷ Ibid.

NATO countries. Ammunition is eligible for inclusion in AOP-6 if it is in the inventories of two or more NATO nations and if it meets the criteria for one of the following volumes:

- *Volume 1.* To identify ammunition that can be interchanged in case of logistic emergency in operations
- *Volume 2.* To specify approved ammunition that can be used safely and reliably in training and operations, without further authorization
- *Volume 3.* To specify approved ammunition that can be used safely and reliably in training only.

Volume 1, now in a Windows 95 version, can help answer the following questions:¹⁸

- Which countries have a selected caliber ammunition (small calibers to missiles)?
- Which countries have interchangeable ammunition for that selection?
- Given a weapon's model number, what other NATO member countries have that weapon in their inventory? In addition, what other country's weapons can be used to fire the same caliber ammunition fired by the given weapon?
- What are all the weapons and ammunition data submitted by the NATO member countries?
- Which countries have submitted key remarks/words regarding the functionality of an ammunition/weapon?

E. U.S. SECURITY ASSISTANCE

The U.S. security assistance program meets foreign policy and national security objectives by providing economic and military assistance to allied and friendly governments. The program provides defense articles, services, and training through either sales and leases or grants and loans. Two pieces of legislation control this program: the 1961 Foreign Assistance Act and the 1976 Arms Export Control Act (AECA). The State Department gives general supervision in directing the program and integrating it. The DoD administers the program by conducting the requirements determination, establishing priorities, procuring the equipment and services, and providing for their transportation and delivery. Within the DoD, the Defense Security Cooperation Agency (DSCA) directs, administers, and supervises the DoD security

¹⁸ Quality Evaluation and Safety Team (QUEST) Standardization Group AOP-6 Web site, TACOM-ARDEC International Office, <http://www.pica.army.mil/orgs/edmd/edd/sb/AOP-6.html>.

assistance programs and serves as the DoD focal point and clearinghouse for the development and implementation of security assistance plans and programs.¹⁹ The agency monitors major weapon sales and technology transfer issues, budgetary and financial arrangements, legislative initiatives and activities, and other security assistance matters.

1. Foreign Military Sales Program

Among the major security assistance programs is the Foreign Military Sales (FMS) program. Authorized by the AECA, the FMS program sells defense articles and services (including training) from DoD stock or through DoD procurement.

The U.S. Army Security Assistance Command (USASAC) is one of the Army's major subordinate commands and it is the center for FMS.²⁰ USASAC is responsible for the Army's security assistance programs including—

- Providing total program planning, delivery, and life cycle support of equipment, services, and training to our allies and international partners
- Providing total program management for co-production with our allies and international partners
- Negotiating and implementing co-production agreements
- Managing export licenses for the U.S. Army

Within the U.S. Army's Industrial Operations Command (IOC)²¹ at Rock Island Arsenal is the Deputy Chief of Staff for Security Assistance Management (DCS-SAM). The DCS-SAM mission is to enable foreign countries and international organizations to acquire timely and quality conventional ammunition, industrial operations support, training, and related logistics support in furtherance of U.S. national security policies and objectives. To this end, they provide the following services:

- Execute all phases of FMS life-cycle management
- Perform intensive management of FMS requirements
- Manage co-production programs
- Evaluate and support foreign customer requests

¹⁹ Defense Security Cooperation Agency website, <http://www.dsca.osd.mil>.

²⁰ USASAC website, <http://www.army.mil/amc/sac/welcome.html>.

²¹ Industrial Operations Command website, <http://www.ioc.army.mil/home/index.htm>.

- Perform FMS product line management functions
- Control transfer of military technology to foreign governments
- Prepare letters of offer/acceptance
- Control transfer of military materiel to foreign governments
- Develop and implement functional policies/procedures and automation initiatives

a. Sales

Sales of U.S.-produced military ammunition and weapons would occur through the FMS program. Sales of technical data packages (TDPs) are also handled under this program. Each embassy has an FMS office in it, as the Arms Export Control Act limits FMS dealings to those strictly between two governments. The 1994 NATO Participation Act gave the Czech Republic, Hungary, and Poland eligibility to receive U.S. Excess Defense Articles via grant under Section 516 of the Foreign Assistance Act.²²

b. Technical Assistance

Although services are only a small part of current FMS sales, services as well as military products and TDPs can be sold. The sale of technical services to the three new NATO member countries may be a good way to give them expertise and assistance in establishing and converting facilities to produce NATO-compatible ammunition and weapons. U.S. defense organizations and expertise can be leveraged to assist in Western-style ammunition and weapons production and modernization efforts.

Typical FMS services include—

- Production Facility Evaluations (PFE), including modernization consulting
- Development of requests for proposals
- TDP sales
- Testing services and ballistic computations
- On-the-job training (OJT) services

Personnel at TACOM-ARDEC suggested that they could provide the following types of services under the FMS:

²² Michael N. Beard, *United States Foreign Military Sales Strategy: Coalition Building or protecting the Defense Industrial Base*, March 1995.

- Technical preparation of demilitarization plans for conventional ammunition
- Engineering design (armaments, ammunition, fire control)
- Engineering material research
- Software development
- Contract management
- OJT on-site at Picatinny Arsenal
- Life-cycle safety technical assistance
- Suggestions on capital improvements and production changes as part of a PFE

In most instances, the foreign government does not choose to obtain these services from commercial sources. Some of their reasons follow:

- The service is not available commercially as no commercial market supports the requested service.
- The foreign customer needs government to government confidentiality assurances since the ultimate objective may be a procurement action.
- Classified work may be involved.
- Protection of national security interests and intellectual property rights is a concern.

Watervliet Arsenal has indicated that it may also be of assistance in providing various types of services, which fall under the auspices of FMS. Watervliet has specifically been assessing how its products and services could fulfill the needs of the new NATO members. Indeed, "the Arsenal stands ready to provide a myriad of quality products and services to satisfy any customer requirements."²³

In general, Watervliet maintains capabilities in the following:

- Manufacturing services
- Forging/casting
- Heat treatment
- Plating/surface coating
- Fabrication
- Packaging/preservation

²³ *Watervliet Arsenal Guide to Manufacturing Capabilities* (brochure).

- Quality
- Manufacturing support services
- Technical services
- Consulting services

The Arsenal's technical services include:

- Refinement of Technical Data Packages
- Reverse engineering services
- Complete process development
- Rapid prototyping (stereolithography facility is approved for classified work up to Secret)
- Process engineering
- Producibility engineering
- New plant start-up
- Factory training programs

In addition, because of its co-location with Benet Labs, an Army research and development lab, this also allows for access to concurrent design and manufacturing experience aimed at decreasing lead times and adding value to a project. Watervliet also expects to be able to provide support to NAMSA in its role as NATO's logistics and support agency for weapon and equipment systems.

2. Co-production

Co-production represents another option that the three new NATO countries might pursue to phase-in Western style armaments production. Cooperative production would both make new members partially responsible for their own defense production needs and build cooperation with the West. Established cooperative networks can be explored, including the Army's Rock Island Arsenal, which runs the co-production program through the Industrial Operations Command.

The Directorate of Armaments Cooperation under the Deputy Under Secretary of Defense for International and Commercial Programs manages acquisition activities with foreign countries, such as international research, development, and production. Within these areas of responsibility, they implement policies and procedures for strengthening standardization and interoperability.

Offsets represent another kind of cooperative venture. For example, Poland, Hungary, and the Czech Republic are reportedly discussing a joint purchase of more than 100 multipurpose war planes that would entail offset agreements—either reciprocal contracts or capital investment deals for the local defense industries to produce some portion of the aircraft.

F. OPPORTUNITIES WITH COMMERCIAL INDUSTRY

In addition to pursuing opportunities for access to products and services through FMS, these new members' governments and even domestic defense industries may also consider working directly with commercial industry. Two options may exist in this area, including the direct sale of products and services, and cooperation through mergers and acquisition.

1. Direct Sales

In the United States the export of defense products and services is governed by the "International Traffic in Arms Regulations" (ITAR). Administered by the U.S. Department of State's Office of Defense Trade Controls (DTC), Bureau of Military Affairs, the ITAR allows the State Department to remain aware of the manufacturing and exporting of defense products and services in order to make sure that such sales are in line with established foreign policy.

The ITAR applies to two types of categories, products and services, which are "deemed to be inherently military in character."²⁴ "Defense products" refer to the products themselves, models, and mockups. Products that are subject to the ITAR are listed and maintained in the U.S. Munitions List. Defense services include providing technical data and "furnishing ... assistance, including training, to foreign persons in the design, engineering, development, production, processing, manufacture, use, operation, overhaul, repair, maintenance, modification, or reconstruction of defense articles."²⁵

U.S. companies that manufacture and export defense products and services are required to register with the DTC. This serves as the precondition to licensing, which entails an application process that specifically identifies the products and services for

²⁴ "Title 22 – Foreign Relations; Chapter I – Department of State; Subchapter M – International Traffic in Arms Regulations," *Code of Federal Regulations* (Excerpts), revised as of 1 April 1992.

²⁵ *Ibid.*

export as well as the country of end use (i.e., the country to which the products and services will be exported). The Director of the DTC issues the license that permits the export of defense products and services. There also exists a manufacturing license agreement “whereby a U.S. person grants a foreign person an authorization or a license to manufacture defense articles abroad and which involves or contemplates (a) the export of technical data ... or defense articles or the performance of defense services, or (b) the use of the foreign person of technical data or defense articles previously exported by the U.S. person.”²⁶

As part of the ITAR, a list of countries is maintained to which it is U.S. policy to deny licenses and approvals on the export of defense products and services. The country of end use for a U.S. defense product or services export also needs “to certify that they will not reexport, resell, or otherwise dispose of the commodity” outside of that country,²⁷ by completing a “Nontransfer and Use Certificate.” Firearms in particular are considered Significant Military Equipment (SME) and, therefore, require this certification. Some examples of when this applies to exports are as follows:

- Fully automatic weapons
- Rifles fifty caliber and more
- Fifty or more firearms of any type
- One hundred thousand or more rounds of ammunition of any type.²⁸

2. Mergers and Acquisitions

The director of the NATO Industrial Advisory Group (NIAG), Krystian Platkowski, told the Polish Chamber of National Defense Manufacturers, “There is little chance for national industries to survive if they don’t merge with Western defense industries.”²⁹ The Czech Defense ministry spokesperson, Milan Repka, agreed with him. For example, last year Boeing purchased a 35 percent stake in Aero Vodochody, a Czech producer of light aircraft, including respected jet fighter trainers.³⁰

²⁶ Ibid.

²⁷ “Instructions for the Permanent Export of Firearms and Ammunition” (U.S. Munitions List Categories I and III), 11 January 1999.

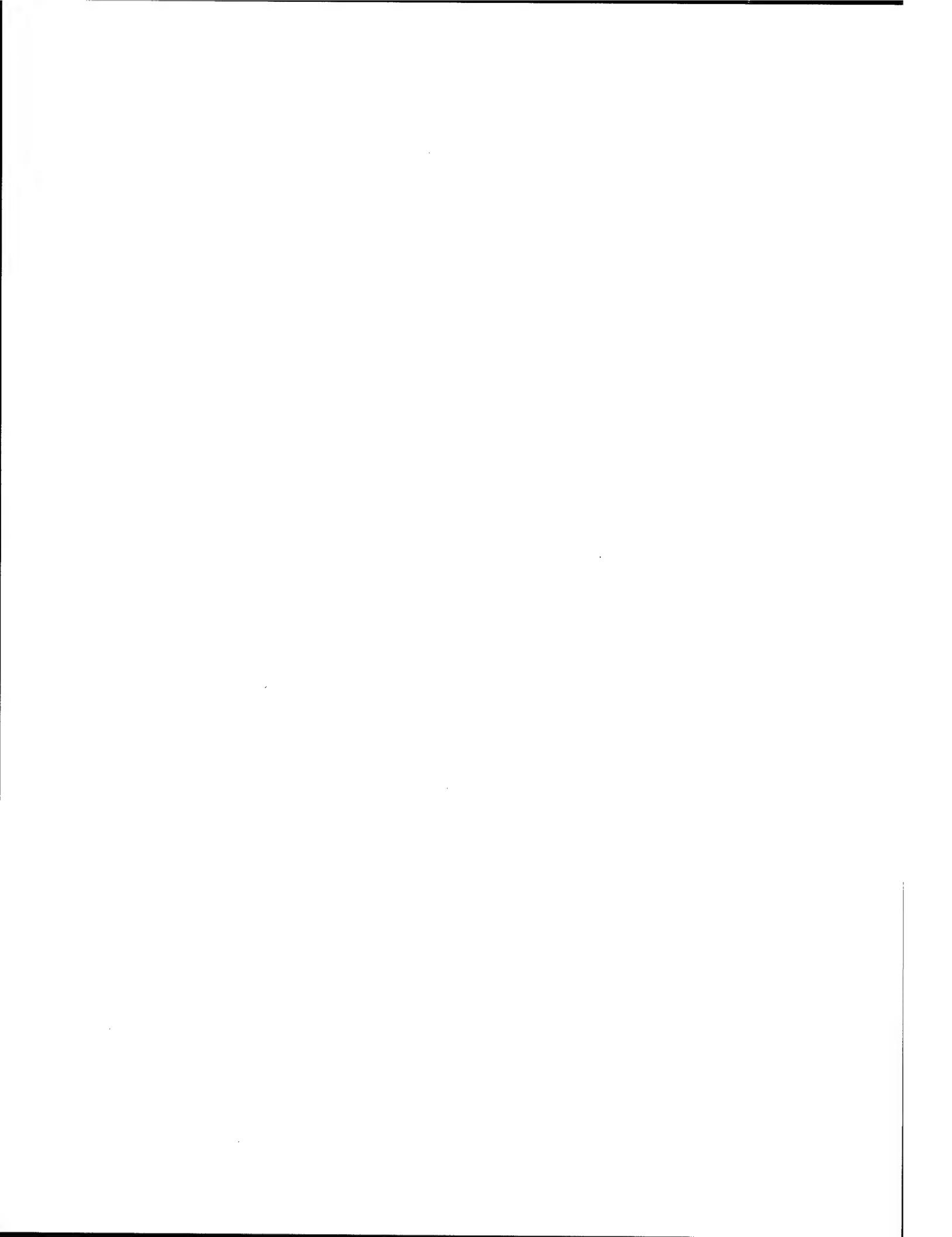
²⁸ Ibid.

²⁹ AP Online article, “NATO Gives Europe Defense Biz Boost,” 6 March 1999.

³⁰ Ibid.

As another example, "Lockheed Martin and McDonnell Douglas have offered [Hungary] very generous lease plans in coordination with the U.S. Air Force F-16, U.S. Navy F/A-18, and the Defense Security Assistance Agency. Both Lockheed and McDonnell Douglas have pledged approximately one billion dollars worth of industrial cooperation with a new plane purchase agreement and some industrial cooperation in conjunction with a used plane lease."³¹

³¹ "Hungary," *European Diversification*.



5. SUMMARY OBSERVATIONS AND RECOMMENDATIONS

A. SUMMARY OBSERVATIONS

During the course of this study, we discovered that the defense industries of the Czech Republic, Hungary, and Poland are better positioned with regard to quality and safety in manufacturing than perhaps previously expected. Various domestic defense manufacturers within each of the three new NATO countries have experience in exporting products and thus can be presumed to have met foreign customer requirements for quality and safety. Furthermore, some defense industries, most notably in Poland, have already sought and achieved ISO 9000 certification.

All three countries appear to have made significant progress toward meeting NATO standards for ammunition and weapons in the small arms field. They have made little progress, however, in meeting those standards in any other of the major ammunition consumable categories. The Czech Republic is moving toward the production of NATO 155mm artillery shells, but appears to be the only country of the three to move beyond small arms ammunition production at this time. This phenomenon may be a legacy effect from these countries' years within the Soviet system: too much expertise in the production of larger caliber ammunition and weapons may have been perceived as a potential threat to influence in the region. Nevertheless, the NATO-16 and the three new members need to recognize the greater incompatibility in the larger calibers and focus modernization and procurement in these areas.

Some additional observations from this study are as follows:

- Many of these countries, as a matter of state policy, have resolved to retain an indigenous arms industry; thus, any solutions to assist these countries should consider this fact.
- All three countries appear to be moving toward NATO standardization through a three-track procurement strategy (in order of priority):
 - Local upgrades and modifications
 - License foreign production
 - Foreign purchases

- The likelihood exists that U.S. ammunition manufacturers could be encouraged to assist Central European manufacturers in adapting to NATO and ISO standards. The forging of these partnerships is important for rapidly and cost-effectively moving these countries toward NATO standards.
- Several Western ammunition manufacturers are exploring joint ventures with companies in Poland and the Czech Republic; however, no firm commitments have been made to date.
- Ammunition manufacturing in the three countries studied is a mix of state-owned and private companies, making broad approaches difficult. Each country must therefore examine its own needs and tailor an approach accordingly.
 - Czech Republic's defense industry is a mix of private and state-owned.
 - Poland's defense industry is state-owned, but recent decisions indicate that key defense industries will soon to be privatized.
 - Hungary's defense industry is state-owned and will attempt in the near future to privatize. The future of its defense industry is unclear, and any attempts to motivate change must be tempered with this in mind.
- Among the countries studied, the Czech Republic is the furthest along in achieving NATO and ISO standards. Poland is next and Hungary is the furthest from meeting such standards.
- The Czech Republic has achieved its rapid progress toward standardization through years of trading with the West—primarily through the sales of hunting and sporting ammunition. This trade forced Czech ammunition manufacturers to closely follow Western manufacturing standards and practices.
- Poland and Hungary need the most assistance in areas other than small arms ammunition, e.g., artillery and mortar round production.

B. RECOMMENDATIONS

As the new NATO members seek to modernize their armed forces, much of their effort is to ensure NATO compatibility of their forces in such areas as ammunition and weapons. This study has identified the following three alternatives for these countries to follow in order to modernize their militaries and achieve NATO compatibility:

- Purchase compatible ammunition and weapons from the West
- Produce domestically compatible ammunition and weapons using Western manufacturing practices with respect to quality and safety

- Engage in co-production activities to acquire compatible ammunition and weapons

Each of the three new NATO members, after weighing their own political, military, and economic considerations, will have to choose an approach based on these three basic alternatives. In all likelihood, however, they will pursue some combination of the three alternatives tailored to their own domestic circumstances. For example, solely purchasing NATO-compatible ammunition and weapons from the West would likely prove too costly given the budgetary constraints still faced by these countries. Manufacturing the necessary ammunition and weapons domestically would assist in meeting domestic defense needs and would bolster the health of the domestic defense industry and economy. But all three countries' defense industries may require some level of assistance in implementing Western-style manufacturing practices with regard to safety and quality. Co-production may serve as an interesting alternative that would use the expertise and resources of Western nations and industries, while maintaining portions of the production domestically.

The transition for these new NATO members to Western-style production, safety, and quality practices in order to produce NATO-compatible ammunition and weapons will be an expensive process that has to be faced as a long-term proposition. In the near term, efforts should focus on such things as common terminology, safety procedures, and compatible system procedures. As new NATO members, the Czech Republic, Hungary, and Poland will continue to become familiar with and immerse themselves in the activities and procedures related to quality, safety, and standardization already taking place under the auspices of NATO, as described in Chapter 4.

In addition to turning to ongoing NATO organizations and procedures, the Czech Republic, Hungary, and Poland should also leverage opportunities to tap the expertise in ammunition of the U.S. and DoD. Picatinny Arsenal and Watervliet Arsenal both stand poised to offer an array of technical services, through the FMS, aimed at various aspects of manufacturing safe and quality products. Furthermore, the purchase of defense products and services may also be arranged directly with U.S. commercial industry under the ITAR.

Appendix A

**AMMUNITION AND WEAPONS MANUFACTURED BY THE
THREE COUNTRIES**

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Seller & Beloit Trade							
<i>Pistol and Revolver Cartridges</i>							
Full Metal Jacket	6.35 mm x 16 Browning	X	X	X	X	X	
Full Metal Jacket	.7.62 mm x 25 Tokarev						
Full Metal Jacket	7.65 x 32 Browning	X	X	X	X	X	
Full Metal Jacket	9 mm x 17 Browning	X	X	X	X	X	
Full Metal Jacket	9 mm x 19 Parabellum (Luger)	X	X	X	X	X	
Full Metal Jacket	9 mm x 19 Parabellum (Luger)	X	X	X	X	X	
Soft Point	9 mm x 19 Parabellum (Luger)	X	X	X	X	X	
Lead Round Nose	9 mm x 19 Parabellum (Luger)	X	X	X	X	X	
Full Metal Jacket	9 mm x 21	X	X	X	X	X	
Full Metal Jacket	9 mm x 18 Makarov						
Lead Round Nose	.38 Special	X	X	X	X	X	
Wadcutter	.38 Special	X	X	X	X	X	
Full Metal Jacket	.38 Special	X	X	X	X	X	
Soft Point	.38 Special	X	X	X	X	X	

Note: An X in a table cell can be read as yes and a cross-hatched cell as no.

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Full Metal Jacket	.357 Magnum	X	X	X			
Soft Point	.357 Magnum	X	X	X			
Full Metal Jacket	.40 Smith & Wesson	X	X	X			
Full Metal Jacket	.45 Auto	X	X	X	X		
<i>Rifle Cartridges</i>							
Full Metal Jacket	5.56 mm x 45 NATO (SS109)	X	X	X	X	X	
Full Metal Jacket	.223 Remington (5.56 mm x 45 NATO)	X	X	X	X	X	
Full Metal Jacket	5.6 mm x 50R Magnum						
Soft Point	5.6 mm x 50R Magnum						
Full Metal Jacket	5.6 mm x 52R						
Soft Point	5.6 mm x 52R						
Soft Point	.243 Winchester	X	X	X	X	X	
Soft Point	6.5 mm x 52R	X	X	X	X	X	
Soft Point	6.5 mm x 55SE	X	X	X	X	X	
Soft Point	6.5 mm x 55SE	X	X	X	X	X	
Soft Point	6.5 mm x 57	X	X	X	X	X	
Soft Point	6.5 mm x 57R	X	X	X	X	X	
Soft Point	.270 Winchester	X	X	X	X	X	
Soft Point	7 mm x 57	X	X	X	X	X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Soft Point Cutted Edge	7 mm x 57	X	X	X	X		
Hollow Point Cavity with Copper Ball	7 mm x 57	X	X	X	X		
Soft Point	7 mm x 57R	X	X	X	X		
Soft Point Cutted Edge	7 mm x 57R	X	X	X	X		
Hollow Point Cavity with Copper Ball	7 mm x 57R	X	X	X	X		
Soft Point	7 mm x 64	X	X	X	X		
Soft Point Cutted Edge	7 mm x 64	X	X	X	X		
Hollow Point Cavity with Copper Ball	7 mm x 64	X	X	X	X		
Soft Point	7 mm x 65R	X	X	X	X		
Soft Point Cutted Edge	7 mm x 65R	X	X	X	X		
Hollow Point Cavity with Copper Ball	7 mm x 65R	X	X	X	X		
Full Metal Jacket	.303 British	X	X	X	X		
Soft Point	.303 British	X	X	X	X		
Full Metal Jacket (Armor Piercing)	.308 Winchester (7.62 mm x 51)	X	X	X	X		
Soft Point Cutted Edge	.308 Winchester (7.62 mm x 51)	X	X	X	X		
Full Metal Jacket (Tracer)	.308 Winchester (7.62 mm x 51)	X	X	X	X		
Soft Point	.308 Winchester (7.62 mm x 51)	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Hollow Point Cavity with Copper Ball	.308 Winchester (7.62 mm x 51)	X	X	X	X		
Hollow Point Cavity Boat Tail	.308 Winchester (7.62 mm x 51)	X	X	X	X		
Soft Point Cutted Edge	30-06 Springfield	X	X	X	X		
Full Metal Jacket	30-06 Springfield	X	X	X	X		
Soft Point	30-06 Springfield	X	X	X	X		
Hollow Point Cavity with Copper Ball	30-06 Springfield	X	X	X	X		
Hollow Point Cavity Boat Tail	30-06 Springfield	X	X	X	X		
Full Metal Jacket	7.62 mm x 39/.311 SB				X		
Soft Point	7.62 mm x 39/.311 SB				X		
Soft Point	8 mm x 57JR	X	X	X	X		
Full Metal Jacket	8 mm x 57JS	X	X	X	X		
Soft Point Cutted Edge	8 mm x 57JS	X	X	X	X		
Hollow Point Cavity with Copper Ball	8 mm x 57JS	X	X	X	X		
Soft Point Cutted Edge	8 mm x 57JRS	X	X	X	X		
Hollow Point Cavity with Copper Ball	8 mm x 57JRS	X	X	X	X		
Soft Point Cutted Edge	8 mm x 64S	X	X	X	X		
Hollow Point Cavity with Copper Ball	8 mm x 64S	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Soft Point	9.3 mm x 72R	X	X	X			
Soft Point	9.3 mm x 74R	X	X	X			
Ammunition Supplies (Unprimed Pistol/Revolver Cases)							
SB 31605 Round	7.62 mm x 25 Tokarev					X	
SB 31610 Round	7.65 mm x 32 Browning					X	
SB 31615 Round	9 mm x 17 Browning Court	X	X	X			
SB 31620 Round	9 mm x 19 Parabellum (Luger)	X	X	X	X		
SB 31625 Round	9 mm x 21	X	X	X	X		
SB 31630 Round	9 mm x 18 Makarov					X	
SB 31635 Round	.38 Special	X	X	X	X		
SB 31640 Round	.357 Magnum	X	X	X	X		
SB 31645 Round	.40 Smith & Wesson	X	X	X	X		
SB 31650 Round	.45 Auto	X	X	X	X		
Ammunition Supplies (Bullets for Pistol/Revolver Cartridges)							
SB 31900 Full Metal Jacket	6.35 mm x 16 Browning	X	X				
SB 31805 Full Metal Jacket	7.62 mm x 25 Tokarev					X	
SB 31905 Full Metal Jacket	7.65 x 32 Browning	X	X	X	X	X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
SB 31910 Full Metal Jacket	9 mm x 17 Browning	X	X	X		X	
SB 31915 Full Metal Jacket	9 mm x 19 Parabellum (Luger)	X	X	X	X		
SB 31920 Full Metal Jacket	9 mm x 19 Parabellum (Luger)	X	X	X	X		
SB 31925 Soft Point	9 mm x 19 Parabellum (Luger)	X	X	X	X		
SB 31835 Lead Round Nose	9 mm x 19 Parabellum (Luger)	X	X	X	X		
SB 31930 Full Metal Jacket	9 mm x 19 Parabellum (Luger) Subsonic	X	X	X	X		
SB 31915 Full Metal Jacket	9 mm x 21	X	X	X	X		
SB 31935 Full Metal Jacket	9 mm x 18 Makarov					X	
SB 31850 Lead Round Nose	.38 Special	X	X	X	X		
SB 31855 Wadcutter	.38 Special	X	X	X	X		
SB 31860 Full Metal Jacket	.38 Special	X	X	X	X		
SB 31865 Soft Point	.38 Special	X	X	X	X		
SB 31870 Full Metal Jacket	.357 Magnum	X	X	X			
SB 31875 Soft Point	.357 Magnum	X	X	X			

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
SB 31880 .40 Smith & Wesson	.40 Smith & Wesson	X	X	X			
SB 31885 .45 Auto	.45 Auto	X	X	X	X		
Ammunition Supplies (Unprimed Rifle Cases)							
SB 33709	5.6 mm x 50R Magnum					X	
SB 33712	5.6 mm x 52R					X	
SB 33715	.243 Winchester	X	X	X	X		
SB 33718	6.5 mm x 52R	X	X	X	X		
SB 33721	6.5 mm x 55SE	X	X	X	X		
SB 33724	6.5 mm x 57	X	X	X	X		
SB 33727	6.5 mm x 57R	X	X	X	X		
SB 33730	.270 Winchester	X	X	X	X		
SB 33733	7 mm x 57	X	X	X	X		
SB 33736	7 mm x 57R	X	X	X	X		
SB 33739	7 mm x 64	X	X	X	X		
SB 33742	7 mm x 65R	X	X	X	X		
SB 33745	.303 British	X	X	X	X		
SB 33748	.308 Winchester (7.62 mm x 51)	X	X	X	X		
SB 33751	30-06 Springfield	X	X	X	X		
SB 33757	8 mm x 57JR	X	X	X	X		
SB 33760	8 mm x 57JS	X	X	X	X		
SB 33763	8 mm x 57JRS	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
SB 33766	8 mm x 64S	X	X	X			
SB 33769	9.3 mm x 72R	X	X	X			
SB 33772	9.3 mm x 74R	X	X	X			
SB 33775	7.62 mm x 54R				X		
<i>Ammunition Supplies (Bullets for Rifle Cartridges)</i>							
SB 33800 Full Metal Jacket	5.6 mm (2901)	X	X	X	X	X	X
SB 33805 Soft Point	5.6 mm (2911)	X	X	X	X	X	X
SB 33810 Full Metal Jacket	5.6 mm (2902)	X	X	X	X	X	X
SB 33815 Soft Point	5.6 mm (2913)	X	X	X	X	X	X
SB 33820 Full Metal Jacket	5.6 mm (2903)	X	X	X	X	X	X
SB 33825 Soft Point	5.6 mm (2914)	X	X	X	X	X	X
SB 33830 Full Metal Jacket	5.6 mm (2904)	X	X	X	X	X	X
SB 33835 Soft Point	5.6 mm (2915)	X	X	X	X	X	X
SB 33840 Soft Point	6.0 mm (2921)	X	X	X	X	X	X
SB 33845 Soft Point	6.5 mm (2925)	X	X	X			
SB 33960 Full Metal Jacket	6.5 mm (2905)	X	X	X			
SB 33850 Soft Point	6.5 mm (2923)	X	X				
SB 33855 Soft Point	6.5 mm (2928)	X	X				
SB 33860 Soft Point	270 (2927)	X	X				

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
SB 33865 Soft Point	7.0 mm (2931)	X	X	X	X		
SB 33870 Soft Point Cutted Edge	7.0 mm (2932)	X	X	X	X		
SB 33875 Hollow Point Cavity with Copper Ball	7.0 mm (2981)	X	X	X	X		
SB 33880 Full Metal Jacket	7.62 mm (2909)	X	X	X	X		
SB 33885 Soft Point	7.7 mm (2939)	X	X	X	X		
SB 33890 Full Metal Jacket	0.3 (2908)	X	X	X	X		
SB 33895 Soft Point Cutted Edge	0.3 (2936)	X	X	X	X		
SB 33900 Full Metal Jacket	0.3 (2957)	X	X	X	X		
SB 33905 Soft Point	0.3 (2937)	X	X	X	X		
SB 33910 Hollow Point Cavity with Copper Ball	0.3 (2983)	X	X	X	X		
SB 33990 Full Metal Jacket	7.62 mm (2907)	X	X	X	X		
SB 33925 Soft Point	7.62 mm (2943)	X	X	X	X		
SB 33930 Soft Point	8.0 mm (2941)	X	X	X	X		
SB 33935 Full Metal Jacket	8.0 mm (2910)	X	X				
SB 33940 Soft point Cutted Edge	8.0 mm (2945)	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
SB 33945 Hollow Point Cavity with Copper Ball	8.0 mm (2986)	X	X	X			
SB 33950 Soft Point	9.3 mm (2951)	X	X	X			
SB 33955 Soft Point	9.3 mm (2952)	X	X	X			
SB 33975 Soft Point	7.62 mm (2940)	X	X	X	X	X	
<i>Shotgun Ammunition</i>							
Super S-Ball Plastik	Gauge 12/70	X	X	X	X	X	
SB Brenneke	Gauge 12/70	X	X	X	X	X	
SB Brenneke	Gauge 12/70	X	X	X	X	X	
Rubber Buckshot	Gauge 12/70	X	X	X	X	X	5 layers each with 3 shots
Rubber Balls	Gauge 12/70	X	X	X	X	X	
Rubber Shot	Gauge 12/70	X	X	X	X	X	
SB Magnum 42.5	Gauge 12/70		X	X	X	X	
<i>Pistols and Rifles</i>							
Model 58 Submachine Gun	7.62 mm x 39 gun				X		
Model 61 Submachine Gun	7.65 mm x 32 Browning gun				X		
Model 61/96 Skorpion Submachine Gun (Silenced)	7.65 mm x 32 Browning gun				X		
CZ 75 Kadet SD Blecha (Silenced)	.22 Long Rifle	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
CZ 75 Pistol	9 mm x 19 Parabellum (Luger) pistol	X	X	X	X		
CZ 75 Mod B/SD Tarantule (Silenced)	9 mm x 19 Parabellum (Luger) pistol	X	X	X	X		
Model 58/96 Sova Assault Rifle	7.62 mm x 39 rifle				X		
Model 58/96SD ZMJE Assault Rifle (Silenced)	7.62 mm x 39 rifle				X		
Model 58 VYR Assault Rifle	7.62 mm x 39 rifle				X		
<i>Ammunition</i>							
M929	30mm cannon round				X	Gun for 2A42 cannon on BMP-2 and BMP-3	
TAPNA 125mm KE Tank Round	125mm APFSDS round				X	Fired by T-72	
PG-15VN with PG-9N Anti-tank Grenade	73mm round				X	Fired by the 2A28 gun of BMP-1	
OG-15VM with OG-9M frag-Grenade	73mm round				X	Fired by the 2A28 gun of BMP-1	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Air-to-Ground Rocket	122mm HE Air to Ground rocket				X		Launched by Helicopters from LRM-122 launcher
MLRS HE Rocket	122mm HE Long Version				X		Fired by RM-70 GRAD MLRS
MLRS HE Rocket	122mm HE Short Version				X		Fired by RM-70 GRAD MLRS
MLRS Mine Rocket-	122mm Mine Rocket				X		Fired by RM-70 and BM-21 with Agat submunition
AGAT submunition	Submunition for 122mm rocket				X		Carried on 122mm MLRS rocket
Krizna-R Rocket	122mm anti-tank mine				X		Carried on 122mm MLRS rocket
Krizna-S Rocket	122mm anti-tank mine				X		Carried on 122mm MLRS rocket (Short-range)
Artillery Round	130mm HE/Full Charge Round				X		Used by M-46 130mm towed artillery
Artillery Round	130mm HE/Reduced Charge Round				X		Used by M-46 130mm towed artillery

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Artillery Round	122mm HE round				X		Used by D-30 and 2S1
Artillery Round	122mm Hollow Charge round				X		Used by D-30 and 2S1
Artillery Round	152mm HE/Full Charge				X		Used by D-20 towed and SP Dana
Artillery Round	152mm HE/Reduce Charge round				X		Used by D-20 towed and SP Dana
VRS-546 Artillery Round	152mm Radio Jamming round				X		Radio Jamming Round
Mortar Round	120mm HE Round				X		Used on the BMP-1 PRAM SP Mortar variant
<hr/>							
Zeveta Group a.s.							
Antitank Weapons							
RPG-75 Antitank Weapon							
68mm antitank round							
Grenades							
URG-86-Rd Hand Grenade							
Exercise Grenade							
Model 86 Universal Hand Grenade							
Hand Grenade							

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
<i>Signal//Flare/Smoke rounds</i>							
Signal Projectiles	Signalling Projectiles				X	X	
Star Flare-40-R-0s Light Projectile	40mm Jet-Star Flare				X	X	
Reactive Flare Timing Cartridge 50-R-Os-c	50mm Reactive Flare Timing				X		
Smoke Shell 3D6	81mm Smoke Shell				X		
<i>Adamoske Strojirny a.s. Adamov</i>							
<i>Antitank Weapons</i>							
RPTZ 96	130mm Antitank weapon				X		Handheld antitank rocket
<i>Moex-Vlarske Strojirny Slavicin</i>							
<i>Fuzes</i>							
KZ-88 Artillery Fuze	Exercise Grenade				X		
MZ-81 Fuze	120mm HE mortar fuze				X		Used on PRAM-S BMP-1 mortar variant
V-429E Fuze	125 HE-Frag tank round				X		
<i>Air Dropped Bombs</i>							
Jupiter HE Air Bomb	111 kg bomb				X		
Sepie Practice Bomb	64 kg bomb				X		
VTUVVM (Military Institute for Weapon and Ammunition Technology)							

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
<i>Weapon/Mortar</i>							
RPG-75 Antitank Weapon	68mm antitank round				X		Handheld antitank rocket
Commando Mortar	60mm mortar	X	X	X	X		
<i>Pistols/Rifle</i>							
Bulldog Model 58/98 Sub-machine Gun	9 mm x 19 Parabellum gun	X	X	X	X		
Bulldog Model 58/98S Silenced Sub-machine Gun	9 mm x 19 Parabellum gun	X	X	X	X		
Model 58/97 Sniping Rifle	7.62 mm x 39 rifle					X	
<i>PS Polickske Strojirny</i>							
<i>Weapons</i>							
VR-3	122mm rocket launcher				X		122mm rocket with antipersonnel mines
Kraken Firearm	59mm non-lethal weapon				X		
<i>Ammunition</i>							
UTN-11 Bangalore Torpedo Mine	Mine unit						
Anti-tank Universal Mine	Mine unit					X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
OF-412 Tank Round	100mm HE round				X		Fired by 100mm equipped T-54, T-55, SAU, and BS3
Tank Round	125mm HE-Frag round				X		Fired by T-72
SVO Missile	Mine clearing rocket				X		Mounted on BMP-1 mine-clearing variant
PP (Mi S-1 M) Antipersonnel Mine	122mm rocket				X		Submunition carried on 122mm rocket fired by VR-3
PG-15VN with PG-9N Anti-tank Grenade	73mm round				X		Fired by the 2A28 gun of BMP-1
OG-15VM with OG-9M frag-Grenade	73mm round				X		Fired by the 2A28 gun of BMP-1
Synthesis							
Single Base Propellants							
S-011	tubular porous powder	X	X	X	X		pistol and revolver loads

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
S-012	tubular porous powder					X	pistol and revolver cartridges, 7.62 x 25 mm Tolarev with heavy bullets
S-015	disc porous powder	X	X	X			shotgun powder for sports cartridges
S-020	flake powder	X	X	X			pistol loads (powder developed for 9 mm caliber)
S-022	flake powder					X	7.62 mm x 39 and 7.62 mm x 54R (AK-47 and Czech M 58)
S-030	flake porous powder	X	X	X			shotgun powder for sports cartridges with a shot of 28 g (1oz)

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
S-032	flake porous powder	X	X	X			shotgun powder for sports cartridges with a shot of 32g (1 1/8oz)
S-035	flake porous powder	X	X	X			shotgun powder for cartridges with a shot of 35-36g(1 1/4oz)
S-040	tubular porous powder	X	X	X	X		22 Hornet, is also suitable for magnum revolver cartridges with heavy bullets
S-050	tubular powder				X		7.62 mm x 45 cartridges and 9 mm expanding apparatuses
S-055	tubular powder	X	X	X			rifle powder for small and medium cartridges with light bullets

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
S-060	tubular powder	X	X	X	X		universal rifle powder designed for 7.62 mm x 54 cartridges
S-062	tubular powder	X	X	X			universal rifle powder designed for hunting cartridges. burns a little more slowly than S-060
S-065	tubular powder	X	X	X			universal rifle powder, designed for hunting cartridges. burns a little more slowly than S-060 and S 062
S-070	tubular powder	X	X	X			rifle powder for cartridges with heavier bullets designed for 7 mm x 64 cartridges with heavy bullet

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
S-082	tubular powder				X	120 mm mortar (additional charge) for OF 843 round	
S-120	7-perforated powder			X	X	120 mm mortar charge – long range	
New charges for 60 and 81 mm mortars	?	X	X	X	X	60 and 81mm mortar charges	
S-140 (Z40)	7-perforated powder				X	125 mm tank rounds (T-72) 12/7VN	
S-180 (Z52)	long tubular powder				X	125 mm tank rounds (T-72) 15/1VN	
New Development (Z62)	?				X	125 mm tank rounds (T-72) with APFSDS-T Round	
New Development (Z63)	?				X	125 mm tank rounds (T-72) with APFSDS-T Round	
S-145	7-perforated powder				X	122 mm howitzers rounds 12/7	
S-173	tubular powder				X	122 mm howitzers rounds 15/1	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
S-191	VTCH					X	122 mm howitzers rounds
Double Base Propellants							
D-015	flake powder				X		shotgun powder for sports cartridges
D-020	spherical powder (rolled)				X		9 mm x 18 Makarov cartridges with light bullet
D-023	spherical powder (rolled)				X		9 x 18 mm Makarov with light bullet (4.5 grams) for special use
D-032	spherical porous powder				X		9 x 18 mm Makarov

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Document Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-032N	spherical porous powder	X	X	X	X		universal pistol powder, can also be used in the 9 mm x 19mm Parabellum (Luger), also suitable for shotgun cartridges with charges of 28 g (1 oz)
D-033N	spherical porous powder	X	X	X	X		universal pistol powder, can also be used in the 9 mm x 19mm Parabellum (Luger), also suitable for shotgun with charges of 32 g (11/8 oz)

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-034	spherical porous powder				X		pistol powder for cartridges with heavy bullets and magnum or shotgun cartridges with charges of 36g(1 1/4oz)
D-051	flake powder				X	X	testing cartridges
D-055	stripe powder				X		120 mm mortar ignition charge for OF 843 round
D-056	flake powder				X		120 mm mortar charge (vz.24)
New charges for 60 and 81 mm mortars	?		X	X	X		60 and 81mm mortar charges
D-058	flake powder					X	120 mm mortar charge for OF 843 round
D-059	stripe powder					X	small gun system 73 mm (PG-9) for BMP-1

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-063	spherical powder				X		powder developed for 7.62 mm x 39 Russian military cartridge
D-073L	spherical powder	X	X	X			versatile rifle powder, can be used also in 5.56 mm NATO (M193) and 5.56 mm (M855) NATO
D-073T	spherical powder	X	X	X	X		versatile rifle powder, can be used also in 5.56 mm NATO M855/M856 and SS109 with heavy bullet NATO
D-075	spherical powder					X	5.45 mm x 39 Russian cartridge (AK-74)

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-083	spherical powder	X	X	X			rifle powder similar as D-073, can be also used in 7.52 mm x 54R Russian, 7.62 NATO M80 or .308 Win.
D-100	spherical powder				X	X	12.7 mm x 107
D-110	long tubular powder				X	X	antitank recoilless system (RPG-75)
D-143 (ZN 546)	long tubular powder				X	X	152 mm howitzer (self propelled ammo) Dana and D-20
D-144 (ZN 546)	long tubular powder				X	X	152 mm howitzer (self propelled ammo) Dana and D-20
New 155mm Combustible case	?	X	X	X	X		155 NATO Artillery Systems
New Modular 155mm Combustible case	?	X	X	X	X		155 NATO Artillery Systems

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-150	long tubular powder				X	X	100 mm cannon cartridge NDT-3
D-153	long tubular powder				X	X	100 mm cannon cartridge (vz. 44)
D-155	long tubular powder				X	X	100 mm cannon cartridge
Double Base Rocket Propellants							
D-210	propellant rocket engine				X		
D-215	30mm signal rocket				X		
D-218	gas generator for a liquid fire projector				X		
D-220	rocket system for a safe aircraft pilot seat				X		
D-222	rocket for night lighting				X		
D-224	rocket for night lighting				X		
D-226	40 mm signal lighting rocket				X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
D-232	rocket engines for various use				X		
D-233	rocket engines for various use				X		
D-235	rocket for various lighting				X		
D-236	rocket for drawing rope				X		
D-238	rocket for night lighting				X		
D-240	rocket propelled aircraft bomb				X		
D-243	special anti-tank artillery system				X		
D-270	122 mm rocket missile battery system, first stage				X		
D-274	122 mm rocket missile battery system, second stage				X		
D-276	aircraft rocket missile				X		
<i>Anti-tank Long-Rod Penetrator</i>							
Long-Rod Penetrator New Development (Z62)	125mm APFSDS-T round						

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Long-Rod Penetrator New Development (Z63)	125mm APFSDS round				X		125 mm tank rounds (T-72) with APFSDS-T Round
Zbrojovka Vsetin							
Machine Guns							
UkT-95 Universal Tank Machine Gun	7.62 mm x 54R machine gun	X	X	X	X	X	
UkT-95N Universal Tank Machine Gun	7.62 mm x 51 NATO machine gun	X	X	X	X	X	
Rachot-TK 95 Tank Machine Gun	7.62 mm x 54R machine gun	X	X	X	X	X	
Rachot-TK 98 Tank Machine Gun	7.62 mm x 51 NATO machine gun	X	X	X	X	X	
Rachot-UK 59 Machine Gun	7.62 mm x 54R machine gun	X	X	X	X	X	
Rachot-UK 68 Machine Gun	7.62 mm x 51 NATO machine gun	X	X	X	X	X	
Falcon-OP 96 Sniper Rifle	12.7 mm x 107 rifle	X	X	X	X	X	
Falcon-OP 97 Sniper Rifle	12.7 mm x 99 (.50) rifle	X	X	X	X	X	
Anti-tank Weapon							
Warrior Heavy weight Anti-tank Weapon	73mm antitank weapon					X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Ammunition							
HE Mortar Rounds	60mm mortar rounds	X	X	X	X	X	
Brno Arms							
Revolvers							
ZHR 820	.38 Special Revolver	X	X	X	X	X	
ZHR 831	.38 Special Revolver	X	X	X	X	X	
Ceska Zbrojovka (CZ)							
Pistols							
CZ 75	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X	X	
CZ 75B	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X	X	
CZ 75B	.40 Smith & Wesson	X	X	X	X	X	
CZ 75B	9 mm x 21	X	X	X	X	X	
CZ 75BD	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X	X	
CZ 75BD	.40 Smith & Wesson	X	X	X	X	X	
CZ 75BD	9 mm x 21	X	X	X	X	X	
CZ 75DAO	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X	X	
CZ 75DAO	.40 Smith & Wesson	X	X	X	X	X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
CZ 75DAO	9 mm x 21	X	X	X			
CZ 75 Kadet	.22 Long Rifle Pistol	X	X	X			
CZ 75 Compact	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 75 Semi-Compact	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
Full Auto CZ 75	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 85	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 85B	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 85 Combat	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 85 Compact	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
Full Auto CZ 85	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 82	9 mm x 18 Makarov Pistol	X	X	X	X	X	

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
CZ 83	7.62 mm x 32 Browning Pistol	X	X	X			
CZ 83	9 mm x 17 Browning Pistol	X	X	X			
CZ 92	6.35 mm x 16 Browning Pistol	X	X	X			
CZ 91S	7.65 mm x 32 Browning Pistol	X	X	X			
CZ 91S	9 mm x 17 Browning Pistol	X	X	X			
CZ 91S	9 mm x 18 Makarov Pistol	X	X	X			
CZ 100	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 100	.40 Smith & Wesson	X	X	X	X		
CZ 101	9 mm x 19 Parabellum (Luger) Pistols	X	X	X	X		
CZ 101	.40 Smith & Wesson	X	X	X	X		
Model 83 Skorpion	9 mm x 17 Browning Pistol	X	X	X	X		
Model 61 Skorpion	7.65 mm x 32 Browning Pistol	X	X	X	X		
Rifles							
CZ 537	.308 Winchester Sniper Rifle	X	X	X	X		

Table A-1. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Czech Republic, conc.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Lada/CZ 2000	5.45 mm x 39 Assault Rifle	X	X	X		X	
Lada/CZ 2000	5.56 x 45 mm Assault Rifle	X	X	X	X		
Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Lada/CZ 2000	5.56 x 45 mm Assault Rifle (Short)	X	X	X	X		
Lada/CZ 2000	5.56 x 45 mm Light Machine Gun	X	X	X	X		

Table A-2. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Hungary

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Matravideki Fémruuvek							
<i>Pistol Ammunition</i>							
Full Metal Jacket-Steel Jacket	7.65 mm x 17SR				X	X	
Full Metal Jacket-Tombak Jacket	7.65 mm x 17SR				X	X	
Full Metal Jacket	9 mm x 17 Browning	X	X	X	X	X	
Full Metal Jacket-FN	9 mm x 19 Parabellum	X	X	X	X	X	
Full Metal Jacket-RN	9 mm x 19 Parabellum	X	X	X	X	X	
Full Metal Jacket	9 mm x 21	X	X	X	X	X	
<i>Rifle Ammunition</i>							
Full Metal Jacket	7 mm x 64	X	X	X	X	X	
Full Metal Jacket-Steel Core	7.62 mm x 39						
Full Metal Jacket-Flat Nose	7.62 mm x 63 (30-06)	X	X	X	X	X	
Full Metal Jacket-Soft Point	7.62 mm x 63 (30-06)	X	X	X	X	X	
Full Metal Jacket-Soft Point	7.62 mm x 63 (30-06)	X	X	X	X	X	
<i>Fegyver és Gazkeszulekgyara NV (FEG)</i>							
<i>Pistols and Submachine Guns</i>							
B9R Pistol	9 mm x 17 Browning	X	X	X	X	X	
P9R Pistol	9 mm x 19 Parabellum	X	X	X	X	X	

Table A-2. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Hungary, continued

Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
P9RA Pistol	9 mm x 19 Parabellum	X	X	X	X		
P9 Pistol	9 mm x 19 Parabellum	X	X	X	X		
KGP9 Submachine Gun	9 mm x 19 Parabellum	X	X	X	X		
<i>Rifles</i>							
AKM-63 Assault Rifle	7.62 mm x 39				X		
AMD-65M Assault Rifle	7.62 mm x 39				X		
<i>Technika Foreign Trading Company</i>							
<i>Pistols and Submachine Guns</i>							
Minimax 9 Pocket Weapon	9 mm x 17 Browning	X	X	X	X	X	
Minimax 9 Pocket Weapon	9 mm x 18 Makarov					X	
Minimax 9 Pocket Weapon	9 mm x 19 Parabellum	X	X	X	X		
<i>Rifles</i>							
NGM Assault Rifle	5.56 mm x 45	X	X	X	X	X	
Gepard M1 Sniper Rifle	12.7 mm x 107					X	
Gepard M1A1 Sniper Rifle	12.7 mm x 107					X	
Gepard M2 Sniper Rifle	12.7 mm x 107					X	
Gepard M2A1 Sniper Rifle	12.7 mm x 107					X	
Gepard M3 Destroyer Heavy Rifle	14.5 mm x 114					X	

Table A-2. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Hungary, continued

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
<i>Pistol Ammunition</i>							
Full Metal Jacket	9 mm x 18 Makarov				X	X	
Reduced Effect ball	9 mm x 18 Makarov				X	X	
<i>Ammunition Supplies</i>							
Full Metal Jacket-Soft Point	7 mm	X	X	X			
Full Metal Jacket-Soft Point	7 mm	X	X	X			
Full Metal Jacket	7.62 mm	X	X	X	X	X	
Full Metal Jacket	7.62 mm	X	X	X	X	X	
Full Metal Jacket	7.62 mm	X	X	X	X	X	
Full Metal Jacket	7.62 mm	X	X	X	X	X	
Full Metal Jacket-Soft Point	7.62 mm	X	X	X	X	X	
Full Metal Jacket-Round Nose	7.62 mm	X	X	X	X	X	
Full Metal Jacket-Flat Nose	7.65 mm					X	
Full Metal Jacket-Flat Nose	7.65 mm					X	
Full Metal Jacket-Flat Nose	9 mm	X	X	X	X	X	
Full Metal Jacket-Flat Nose	9 mm	X	X	X	X	X	

Table A-2. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Hungary, concluded

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Full Metal Jacket-Flat Nose	9 mm	X	X	X	X	X	
Full Metal Jacket-Soft Point	7 mm	X	X	X	X	X	
<i>Mortars</i>							
Vasilek Automatic Mortar	82mm automatic mortar				X	X	
2B11 Crew-Served Mortar	120mm mortar	X	X	X	X	X	
<i>Mechanikai Muvek</i>							
<i>Mortar Ammunition</i>							
Dual-Purpose Mortar Round	82 mm mortar round				X	X	

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Zaklady Metalowe Lucznik							
Pistols and Machine Guns							
MAG-95 Pistol	9mm x 19 Para			X			
VANAD P-83 Pistol	9mm x 18						
AKMS Rifle	7.62mm x 39 of 1943						
GLAUBERT PM-84P Submachine Gun	9mm x 19 Para			X			
GLAUBERT PM-84 Submachine Gun	9mm x 18				X		
TANTAL 88 Automatic Rifle	5.45mm x 39.5				X		
TANTAL 90 Automatic Rifle	5.56mm x 45	ISO9000	Yes	X			
RANDOM-HUNTER Semi-Automatic Rifle	7.62mm x 39 of 1943				X		
ONYX 89 Automatic Carbine	5.45mm x 39.5				X		
ONYX 91 Automatic Carbine	5.56mm x 45	ISO9000	Yes	Yes	X		
P-93 Pistol	9mm x 18					X	
P-83G Gas Pistol	9mm x 19 Para				X		
VIS 35 Pistol	9mm x 19 Para				X		
BERYL Assault Rifle	5.56mm x 45	ISO9000	Yes	Yes	X		

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Zaklady Metalowe Tarnow							
<i>Pistols and Machine Guns</i>							
PALLAD 40mm Grenade Launcher	40mm					X	For Rifle AKMS 5.45 Model 88 TANTAL
PALLAD-D 40mm Grenade Launcher	40mm				X		A Lighter Version for Small Rifle Applications
2.7mm NSW Machine Gun "UTIOS"	12.7mm				X		AAA Mount
Zaklady Przemyslu Metalowego H. Cegielski							
<i>Pistols and Machine Guns</i>							
7.62 PKMP Machine Gun	7.62mm x 54				X		Infantry Weapon Mount
7.62 PKT Machine Gun	7.62mm x 54				X		Armour Vehicle Mount
Widziewskie Zaklady Maszyn							
<i>Pistols and Machine Guns</i>							
GWARD .38SP Revolver	0.38			X			
RG .38 Gas Revolver	0.38			X			
<i>Cartridge Links</i>							
Cartridge Link	12.7mm					X	
Cartridge Link	12.7 UTIOS					X	
Cartridge Link	23 PL type					X	

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Cartridge Link	23 L type				X		
Huta Stalowa Wola							
<i>Large Guns, Artillery, and Mortars</i>							
LM-60D Mortar	60mm			X	X	X	With Baseplate
LM-60K Mortar	60mm			X	X	X	Commando Mortar
M-98 Mortor	98mm					X	New Mortor System
D10-T2S Tank Gun	100mm					X	Gun for T-54/T-55
2A31 Artillery Howitzer	122mm					X	Gun for 2S1 Self-Propelled Artillery
2S1 Self-Propelled Howitzer	122mm					X	Self-Propelled Artillery
BWO-40 Armored Combat Vehicle	40mm L/70					X	Bofors 40mm L/70 Gun/Turret on MTLB
MT-LB-23M Armored Personnel Carrier	23mm					X	MTLB with 23mm Turret
Zaklady Mechaniczne Bumar-Labedy							
<i>Large Guns, Artillery, and Mortars</i>							
T-55 Main Battle Tank	100mm					X	

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
T-72M1Z Main Battle Tank	125mm				X		Polish T-72 Upgrade Export
PT-91 Main Battle Tank	125mm				X		Polish T-72 Upgrade
Zaklady Metalowe Mesko							
<i>Fuzes</i>							
C-88	85mm to 125 mm rounds				X		
M-12	Mortar rounds				X		
UZGR	Hand grenades				X		
W-429 Je	125mm HE Rounds				X		
RGM-2	122mm/152mm Howitzers				X		
<i>Ammunition Supplies</i>							
Full Metal Jacket—Lead Core	5.45mm x 39					X	
Full Metal Jacket—Steel Core	5.45mm x 39					X	
Plastic Jacket	5.45mm x 39 Blank					X	
Full Metal Jacket—Lead Core	5.56mm x 45	ISO9000	Yes		Yes		
Full Metal Jacket—Steel Core	5.56mm x 45	ISO9000	Yes		Yes	X	

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Full Metal Jacket	5.56mm x 45	ISO9000	Yes	Yes	X		
Tracer	5.56mm x 45	ISO9000	Yes	Yes	X		
Full Metal Jacket	5.56mm x 45 Blank	ISO9000	Yes	Yes	X		
Soft Point	7mm x 57R					X	
Soft Point	7mm x 64					X	
Soft Point	7mm x 65R					X	
Blank	8mm					X	
CS Gas	8mm					X	
Full Metal Jacket	9mm x 18 Makarov					X	
Full Metal Jacket	9mm x 18 Makarov Blank					X	
Full Metal Jacket	9mm x 18 Parabellum	ISO 9000	Yes	Yes	X		
Soft Point	9mm x 19 Parabellum	ISO 9000	Yes	Yes	X		
Lead Round Nose	9mm x 19 Parabellum	ISO 9000	Yes	Yes	X		
Anti-Ricochet Round	9mm x 19 Parabellum	ISO 9000	Yes	Yes	X		
Armor Piercing Round	9mm x 19 Parabellum	ISO 9000	Yes	Yes	X		
Full Metal Jacket	9mm x 19 Parabellum Blank	ISO 9000	Yes	Yes	X		

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Blank	9mm					X	
CS Gas	9mm					X	
PA Blank	9mm					X	
PA CS Gas	9mm					X	
Soft Point	.357 Magnum	ISO9000	Yes	Yes			Offered for export
Semi Wad Cutter	.357 Magnum	ISO9000	Yes	Yes			Offered for export
Wad Cutter	.357 Magnum	ISO9000	Yes	Yes			Offered for export
Wad Cutter	.38 Special	ISO9000	Yes	Yes	X		Offered for export
Soft Point	.38 Special	ISO9000	Yes	Yes	X		Offered for export
Lead Round Nose	.38 Special	ISO9000	Yes	Yes	X		Offered for export
Plastic Jacket	.38 Special Normal	ISO9000	Yes	Yes	X		Offered for export
Plastic Jacket	.38 Special Intermediate	ISO9000	Yes	Yes	X		Offered for export
Plastic Jacket	.38 Special Strengthened	ISO9000	Yes	Yes	X		Offered for export
Full Metal Jacket—Lead Core	7.62 x 39	ISO9000	Yes	Yes	X		

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Full Metal Jacket—Steel Core	7.62 x 39						
Tracer	7.62 x 39						
Full Metal Jacket	7.62 x 39 blank						
Full Metal Jacket—Soft Point	7.62 x 53R						
Full Metal Jacket	7.62 x 54R						
Tracer	7.62 x 54R						
Full Metal Jacket	7.62 x 54R						
Soft Point	7.62 x 63/30-06 Springfield	ISO9000	Yes	Yes			Offered for export
Soft Point	.308 Winchester	ISO9000	Yes	Yes	X		
Full Metal Jacket	14.5mm x 114						
Cenzin Foreign Trade Enterprise							
Shotgun Ammunition							
ROJ	Gauge 12/70	ISO9000	Yes	Yes			Disabling Rubber Pellets
BAK	Gauge 12/70	ISO9000	Yes	Yes			Disabling Rubber Round Bullets
CHRABASZCZ 20	Gauge 12/70	ISO9000	Yes	Yes			Disabling Rubber Round Bullets (20m)

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
CHRABASZCZ 30	Gauge 12/70	ISO9000	Yes	Yes			Disabling Rubber Round Bullets (30m)
CHRABASZCZ 50	Gauge 12/70	ISO9000	Yes	Yes			Disabling Rubber Round Bullets (50m)
W-8 MP	Gauge 12/70	ISO9000	Yes	Yes			Lead Slug
LFT 6.8	Gauge 12/70	ISO9000	Yes	Yes			Lead Pellets
PIK PR-94	Gauge 12/70	ISO9000	Yes	Yes			Iron Powder
CS-94	Gauge 12/70	ISO9000	Yes	Yes			Iron Powder and CS
Zaklady Tworzyw Sztucznych Pronit							
<i>Tank Ammunition</i>							
HE Round	125mm				X		2A46 (D-81) Gun for T-72
HEAT Round	125mm				X		2A46 (D-81) Gun for T-72
APFSDS-T Round	125mm				X		2A46 (D-81) Gun for T-72
Training Round	125mm				X		2A46 (D-81) Gun for T-72
Combustible Charge	125mm				X		2A46 (D-81) Gun for T-72

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Gunpowders/Propellants							
SRN-17 (Spherical Gunpowder)	9mm Parabellum	ISO9000	Yes	Yes	X		NATO Compatible Nitrocellulose Gunpowders
P-125 (Graphitized Cylindrical Gunpowder)	9mm Makarov Pistol				X		Nitrocellulose Gunpowders
P-45 (Graphitized Cylindrical Gunpowder)	7.62mm Rifle Round				X		Nitrocellulose Gunpowders
Wulf (Cylindrical Gunpowder)	7.62mm Design 1943				X		Nitrocellulose Gunpowders
WT (Cylindrical Gunpowder)	7.62mm Rifle Round				X		Nitrocellulose Gunpowders
47 (7-Perforation Cylindrical Gunpowder)	12.7mm Round with B-32 Projectile				X		Nitrocellulose Gunpowders
WTZ (Cylindrical Gunpowder)	14.5 Blank Round				X		Nitrocellulose Gunpowders
57 na-gr (7-Perforation Cylindrical Gunpowder)	14.5mm Rounds with B-32 Projectile				X		Nitrocellulose Gunpowders
47 cgr (7-Perforation Cylindrical Gunpowder)	23mm Round with BZA/OFZ Projectile				X		Nitrocellulose Gunpowders (AAA Gun AM-23)

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
5/7 cfl (7-Perforation Cylindrical Gunpowder)	23mm Round					X	Nitrocellulose Gunpowders (AAA Gun for ZU-23)
WTS (Cylindrical Propellant)	85mm, 100mm, and 152mm Blank Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
WTCh-10 (Reduced-Flame Propellant)	Artillery Charges					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
WTCh-20 (Cylindrical Propellant)	Artillery Charges					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
4/1 (Cylindrical Propellant)	122mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
WTM (Cylindrical Propellant)	Mortar Round Increments					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
77 (7-Perforation Cylindrical Propellant)	85mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
9/7 (7-Perforation Cylindrical Propellant)	100mm and 122mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
11/7 (7-Perforation Cylindrical Propellant)	85mm and 122mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
12/7 (7-Perforation Cylindrical Propellant)	122mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
14/7 (7-Perforation Cylindrical Propellant)	85mm and 100mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
12/7wa (7-Perforation Cylindrical Propellant)	125mm Tank Ammunition (T-72)					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
12/1 (Long Stick Propellant)	85mm, 100mm, and 122mm Ammunition					X	Nitrocellulose Propellants (Mortar/Artillery Charges)
15/1wa (Long Stick Propellant)	125mm Tank Ammunition (T-72)					X	Nitrocellulose Propellants (Mortar/Artillery Charges)

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
18/1 (Long Stick Propellant)	85mm and 100mm Ammunition				X	X	Nitrocellulose Propellants (Mortar/Artillery Charges)
Black Powder (Granules in three sizes)	Primers, Igniters, Charges, Delayers				X	X	Nitrocellulose Propellants (Mortar/Artillery Charges)
Full/Reduced Propellant Charge	122mm Howitzer, Design 1938				X	X	With 53-OF-462Z or 462 Projectile
Reduced Propellant Charge	122mm 2S1 Self-Propelled Howitzer				X	X	With 53-OF-462Z or 462 Projectile
Full Propellant Charge	122mm 2S1 Self-Propelled Howitzer				X	X	With 53-OF-462Z or 462 Projectile
Propellant Charge with Increments	120mm Mortar, Design 1938				X	X	With 53-OF-843B Projectile
SOKOL (Laminar Gunpowder)	Shot and Ball Rounds for Shotguns				X		
Zaklady Sprzetu Precyzyjnego Niewiadów							
<i>Anti-Tank Ammunition</i>							
PG-7WM Round	RPG-7				X		Reloadable Launcher with Round

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
PG-15W Round	73mm					X	For BMP-1's 2A28 Gun
RPG-76 "Komar" Round/Launcher	RPG-76					X	Disposable Weapon
<i>Anti-Tank Mines</i>						X	
TM-62 (MPP-B "Wierzba" Anti-Tank Mine)					X		
Anti-Tank Mines					X		
Grenades					X		
F-1 Hand Grenades	55mm				X		
RG-42 Hand Grenades	55mm				X		
Zaklady Elektromechaniczne Belma							
<i>Anti-Tank Mines</i>						X	
MN-111 Mine	Air Delivered Mines					X	
MN-112 Mine	Air/Rocket Delivered Mines					X	
Cezar-100	Fuse					X	
<i>Fuses</i>							
ZMN	Magnetic Fuse for Anti-Tank Mines					X	
WP-7M	Fuse for PG-7					X	
WP-9	Fuse for PG-9					X	
UZRGM	Hand Grenade					X	

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Zaklady Metalowe Dezamet							
Grenades							
RGO Defensive Hand Grenades	57mm				X		
Fragmentation	40mm				X	Grenade Launcher M1974/M1983 for AKM	
Incendiary	40mm				X	Grenade Launcher M1974/M1983 for AKM	
Ballistic	40mm				X	Grenade Launcher M1974/M1983 for AKM	
Practice	40mm				X	Grenade Launcher M1974/M1983 for AKM	
GNPO Armor-Piercing	40mm				X		
NGO Illumination	43mm				X		
NGZ Incendiary	52mm				X		
NGD Smoke Screen	52mm				X		

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
<i>Air Delivered Bombs/Rockets</i>							
PLBO Cluster Bomb	LBO Sub-munition				X	X	
KM/GU Cluster Bomb	UKB-G Sub-munition				X	X	
ZK-300 Cluster Bomb	LBO Sub-munition				X	X	
S-5KO	57mm				X	X	
S-5MO	57mm				X	X	
<i>Osrodek Badawczo-Rozwojowy Skarzysko</i>							
<i>Decoy Targets</i>							
Radar	81mm				X	X	Ship Self-Protection
IR-Homing	81mm				X	X	Ship Self-Protection
Laser Beam	81mm				X	X	Ship Self-Protection
TV-Seeker	81mm				X	X	Ship Self-Protection
Chaff	122mm				X	X	Ship Self-Protection
Chaff/IR	122mm				X	X	Ship Self-Protection
Smoke Screen	122mm				X	X	Ship Self-Protection

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, cont.

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
Trocznia Metali Pressa Spolka Akcyjna							
<i>MLRS Ammunition</i>							
HE Standard (GRAD) BM-21 MLRS Round	122mm				X		
HE Frag (SPALL) BM-21 MLRS Round	122mm				X		
Mine Laying (PLATAN) BM-21 MLRS Round	122mm				X		
<i>Zaklady Tworzyw Sztucznych Erg Bierun</i>							
<i>Blasting Caps</i>							
MG-201T	GK-2 and W5-K Detonator				X		
TAT-1-T	W-429, M-12, and RGM-2 Detonator				X		
TAT-1-PT					X		
MG-8-T	MG-57 and MGNSK Detonator				X		
B-23	B-23U and W5M1 Detonator				X		
K-1-T	GPW-2 Detonator				X		
TAP	P-1 Booster and DC-1 Detonator				X		
7K1	Hand Grenade				X		

Table A-3. Domestic Ammunition and Weapons Production, Including Quality, Warranty, and Safety Information: Poland, concluded

Ammunition and Weapons Manufacturer and Type	Caliber	Quality Certification/Registration	Warranty Information	Documented Safety Standards	NATO Compatible	Eastbloc Compatible	Note
A-30-T	MG-30 Detonator					X	
B-37	PG-7W and PG-9W Rounds					X	
BDM-30-T						X	
7K2	14.5mm Projectile MDZ					X	
<i>Igniters</i>							
PP-9 (Electric Igniter)	M-14OF Projectile					X	
PP-9/10 (Electric Igniter)	LWD					X	
PP-9 RO (Electric Igniter)	LPO-59					X	
GW-5M (Igniting Cap)	S-5M Rocket					X	
GW-5MO1 (Igniting Cap)	RWMS-200K Rocket					X	
<i>Zaklady Mechaniczne Tarnow</i>							
<i>Large Guns, Artillery, and Mortars</i>							
ZSU-23-2 Anti-Aircraft Artillery	23mm					X	AAA Mount
ZSU-23MR	23mm					X	Naval AAA Mount
ZUR-23-2S JOD Anti-Aircraft Artillery	23mm with 9K32mM (SA-7 Strela 2)					X	AAA Mount with SA-7 MANPADS

Appendix B
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Appendix C
LIST OF ACRONYMS

LIST OF ACRONYMS

AC	Atlantic Council
ACodP	Allied Codification Publication
AECA	Arms Export Control Act
AECA	Arms Export control Act
AMCOM	Aviation and Missile Command
AmmoWG	Land Forces Ammunition Interchangeability Working Group
AOP	Allied Ordnance Publication
AQAP	Allied Quality Assurance Publication
ARMP	Allied Reliability and Maintainability Publications
ARV	Armored Recovery Vehicle
ASD	Assistant Secretary of Defense
AV-LB	Armored Vehicle-Laying Bridge
CNAD	Conference of National Armaments Directors
DIO	Defense Industry Office (Hungary)
DLA	Defense Logistics Agency
DLIS	Defense Logistics Information Service
DODAC	Department of Defense Ammunition Code
DSCA	Defense Security Cooperation Agency
DTC	Office of Defense Trade Controls
EAPC	Euro-Atlantic Partnership Council
ECE	East and Central Europe
FMS	Foreign Military Sales

GDP	Gross Domestic Product
GQA	Government Quality Assurance
IDET	International Fair of Defense and Security Technology and Special Information Systems
IFOR	Implementation Force
IFV	Infantry Fighting Vehicle
ISA	International Security Agency
ISO	International Organization for Standardization
ITAR	International Traffic in Arms Regulations
ITU	Institute of Weapon's Systems Technology (Poland)
JACS	Joint Armaments Cooperation Structure
MAS	Military Agency for Standardization
MBS	NATO Mailbox System
MBT	Main Battle Tank
MCRL	Master Cross Reference List
NACC	North Atlantic Cooperation Council
NADB	NATO Ammunition Data Base
NASC	National Abbreviation Short Code
NATO	North Atlantic Treaty Organization
NCB	National Codification Bureau
NIAG	NATO Industrial Advisory Group
NCARC	NATO Conventional Armaments Review Committee
NIMIC	ATO Insensitive Munitions Information Center
NMN	National Model Number
NSN	NATO Stock Number
OCCAR	German-French Armament Organization
OJT	On-the-job training

PfP Partnership for Peace
QAR Government Quality Representative
R&D Research and Development
SFOR Stabilization Force
SME Significant Military Equipment
STANAG Standardization Agreement
TDP Technical Data Package
TRADOC Training and Doctrine Command
USASAC U.S. Army Security Assistance Command
WEAG Western European Armaments Group
WEAO Western European Armaments Organization
WEU Western European Union
WTO Warsaw Treaty Organization

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